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No. 15

## VESSEL CONSTRUCTION IN THE UNITED STATES.

The bureau of navigation reports 393 sail and steam vessels of 68,395 gross tons built in the United States and officially numbered during the quarter ended Sept. 30, 1901. It should be noted that Porto Rico is now officially included in the United States, with one vessel, a sailing craft of 7 tons. Following is the distribution:

	WOOD.				STEEL.				TOTAL.	
	SAIL.		STEAM.		SAIL.		STEAM.			
	No.	Gross tons.	No.	Gross tons.	No.	Gross tons.	No.	Gross tons.	No.	Gross tons.
Atlantic and gulf.....	174	17,756	74	6,669	1	235	12	15,498	261	40,158
Porto Rico.....	1	7							1	7
Pacific.....	14	8,272	16	2,395					30	10,667
Great lakes.....	5	149	36	1,649			8	12,240	49	14,038
Western rivers.....	6	114	44	3,368			2	43	52	3,525
Total.....	200	26,298	170	14,081	1	235	22	27,781	333	68,395

During the corresponding quarter ended Sept. 30, 1900, 308 sail and steam vessels of 88,790 gross tons were built and officially numbered as follows:

	WOOD.				STEEL.				TOTAL.	
	SAIL.		STEAM.		SAIL.		STEAM.			
	No.	Gross tons.	No.	Gross tons.	No.	Gross tons.	No.	Gross tons.	No.	Gross tons.
Atlantic and gulf .....	129	18,880	51	4,095	3	3,360	7	10,192	190	36,527
Pacific .....	10	6,748	15	3,861	.....	.....	2	293	28	10,902
Great lakes.....	5	108	18	482	1	2,790	8	33,677	32	37,057
Western rivers.....	16	297	42	4,007	.....	.....	.....	.....	58	4,304
Total.....	160	26,033	127	12,445	4	6,150	17	44,162	308	88,790

## DEATH OF HENRY W. CRAMP.

Henry W. Cramp, the eldest son of the famous ship builder, Charles H. Cramp, and the vice-president and treasurer of the William Cramp & Sons Ship & Engine Building Co., Philadelphia, died at Devon Inn, near Philadelphia, last Thursday. Acute pneumonia following a general break down, due to hard work, was the immediate cause of death.

Mr. Cramp was born in Philadelphia in 1851 and after completing his education entered the machine shops of the I. P. Morris Co., to learn the practical side of the ship builder's trade. Ill health, however, ordained that he should never learn a mechanical trade and he went to sea for two years in the service of the Clyde line. Later he was in charge of the New York office of the company when it operated the Erie basin dry dock. In 1886 he succeeded his uncle as secretary of the big ship building concern and on May 12, 1891, he became a director. He was elected vice-president and treasurer on June 6, 1895. Essentially a business man, few equaled him in quickness of perception as to the merits of any enterprise brought to his notice. His devotion to work was intense. Except on the command of physicians he had never taken a vacation. Personally he was a most lovable man. He found time to read and study and his tastes led him along a line far deeper and wider than is usual with business men. In this respect he was little short of a student, and this, coupled with a keen faculty for analysis, an acute perception of all that is beautiful, and a memory as retentive as man is ever endowed with, made him a most charming companion. He was a bachelor and a member of numerous clubs. He was extremely charitable.

## SAILORS' SNUG HARBOR OF THE LAKES.

Although he has made no systematic effort to promote the sailors' snug harbor charity of the great lakes, which was encouraged by resolution at the last annual meeting of the Lake Carriers' Association, Mr. Geo. L. McCurdy of Chicago is receiving letters of encouragement from different parts of the country.

E. C. Dunbar of Grand Haven, Mich., says in a letter to Mr. McCurdy: "I take pleasure in enclosing check for snug harbor entertainment. You and I, and all of us dry-land sailors, must depend, when old age comes, for our snug harbor upon that portion of the lake sailor's earnings which we have been able to garner. Let us not begrudge a penny from the common earnings to him who matched his courage against our thrift, and made our foresight productive by his steadfast endurance."

Writing from Milwaukee, Capt. Wm. Jamieson says: "I was of course interested in your letter regarding this worthy undertaking for a deserving poor. After braving many dangers and getting through with little left in life they find themselves stranded on dry land with no harbor of refuge in sight and no harbor to look for in a land of plenty and overflowing. Something should be done for them and on a large scale. You will please find my mite of \$5 enclosed for this most worthy object. I wish you the best of luck and God speed it in your undertaking."

The North German Lloyd steamer Kronprinz Wilhelm arrived at Plymouth from New York after the fastest return maiden voyage on record. Her trip from Sandy Hook lightship was made in 5 days 9 hours and 48 minutes. Her best day's run was 540 miles. This is the fastest maiden voyage eastward by about five hours. The best record to Plymouth is held by the Deutschland of the Hamburg-American line, namely, 5 days 7 hours and 38 minutes.

## SHORTAGE MADE UP.

SHIPS TRADING TO LAKE SUPERIOR HAVE WIPED OUT THE DIFFERENCE IN FREIGHT MOVEMENT DUE TO EARLY OPENING LAST SEASON—  
ONLY SHORTAGE IS IN SOFT COAL.

Again the movement of freight to and from Lake Superior through the two canals at Sault Ste. Marie has exceeded 4,000,000 tons in a single month (September), and it is now estimated that the total movement for the season will exceed 27,000,000 tons, as against, in round numbers, the 25,600,000 tons of 1900. Reports to Oct. 1 show an excess of 467,592 tons over the same date a year ago, but the September movement was more than half a million tons short of August. The exact figures are 4,135,237 tons for September, against 4,687,817 tons for August. The total from the opening of navigation to Oct. 1 this season is 20,369,065 tons, compared with 19,901,473 to Oct. 1, 1900. The only item of importance in which there is a shortage is soft coal, of which 2,896,483 tons had passed through the canals to Oct. 1 of this year, compared with 3,178,113 tons to the same date a year ago, showing a decrease of 281,630 tons. Tables making comparisons of the different items for three years past will be found below:

### MOVEMENT OF PRINCIPAL ITEMS OF FREIGHT TO AND FROM LAKE SUPERIOR.

ITEMS.	To Oct. 1, 1901.	To Oct. 1, 1900.	To Oct. 1, 1899.
Coal, anthracite, net tons.....	529,788	422,375	565,301
Coal, bituminous, net tons.....	2,896,483	3,178,113	2,202,321
Iron ore, net tons.....	13,583,867	13,102,470	11,095,316
Wheat, bushels.....	23,663,694	31,294,217	33,211,799
Flour, barrels.....	4,986,228	4,341,946	4,752,717

### REPORT OF FREIGHT AND PASSENGER TRAFFIC TO AND FROM LAKE SUPERIOR, FROM OPENING OF NAVIGATION TO OCTOBER 1 OF EACH YEAR FOR THREE YEARS PAST.

EAST BOUND.				
ITEMS.	Designation.	To Oct. 1, 1901.	To Oct. 1, 1900.	To Oct. 1, 1899.
Copper.....	Net tons....	61,893	95,518	80,613
Grain, other than wheat.....	Bushels....	9,859,324	7,421,640	18,422,016
Building stone.....	Net tons....	32,709	26,759	21,034
Flour.....	Barrels.....	4,985,883	4,341,734	4,751,142
Iron ore.....	Net tons....	13,583,867	13,102,470	11,095,316
Iron, pig.....	Net tons....	22,746	15,069	19,556
Lumber.....	M. ft. b. m.	771,577	624,645	735,389
Silver ore.....	Net tons....		110	
Wheat.....	Bushels....	23,663,694	31,294,217	33,211,799
Unclassified freight.....	Net tons....	43,629	49,725	99,352
Passengers.....	Number....	24,387	25,778	21,586

WEST BOUND.				
Coal, anthracite.....	Net tons....	529,788	422,375	565,301
Coal, bituminous.....	Net tons....	2,896,483	3,178,113	2,202,321
Flour.....	Barrels.....	345	212	1,575
Grain.....	Bushels....	56,430	21,984	38,500
Manufactured iron.....	Net tons....	90,244	94,317	128,339
Salt.....	Barrels.....	347,017	200,456	242,837
Unclassified freight.....	Net tons....	334,780	294,079	298,521
Passengers.....	Number....	26,329	26,445	23,665

### SUMMARY OF TOTAL FREIGHT MOVEMENT IN TONS.

	To Oct. 1, 1901.	To Oct. 1, 1900.	To Oct. 1, 1899.
West bound freight of all kinds, net tons.....	3,904,553	4,020,388	3,222,167
East bound freight of all kinds, net tons.....	16,464,512	15,881,085	12,255,709
	20,369,065	19,901,473	15,477,876

	Vessel passages.	Registered tons.
To Oct. 1, 1901 ..	14,561	17,706,056
To Oct. 1, 1900 ..	14,919	17,366,783
To Oct. 1, 1899 ..	14,544	15,574,263

Work upon the new power house for the Superior Ship Building Co. has just been begun. The Barnett-Record Co. of Minneapolis has the contract for doing the work on the building. The improvements altogether will cost in the neighborhood of \$75,000.



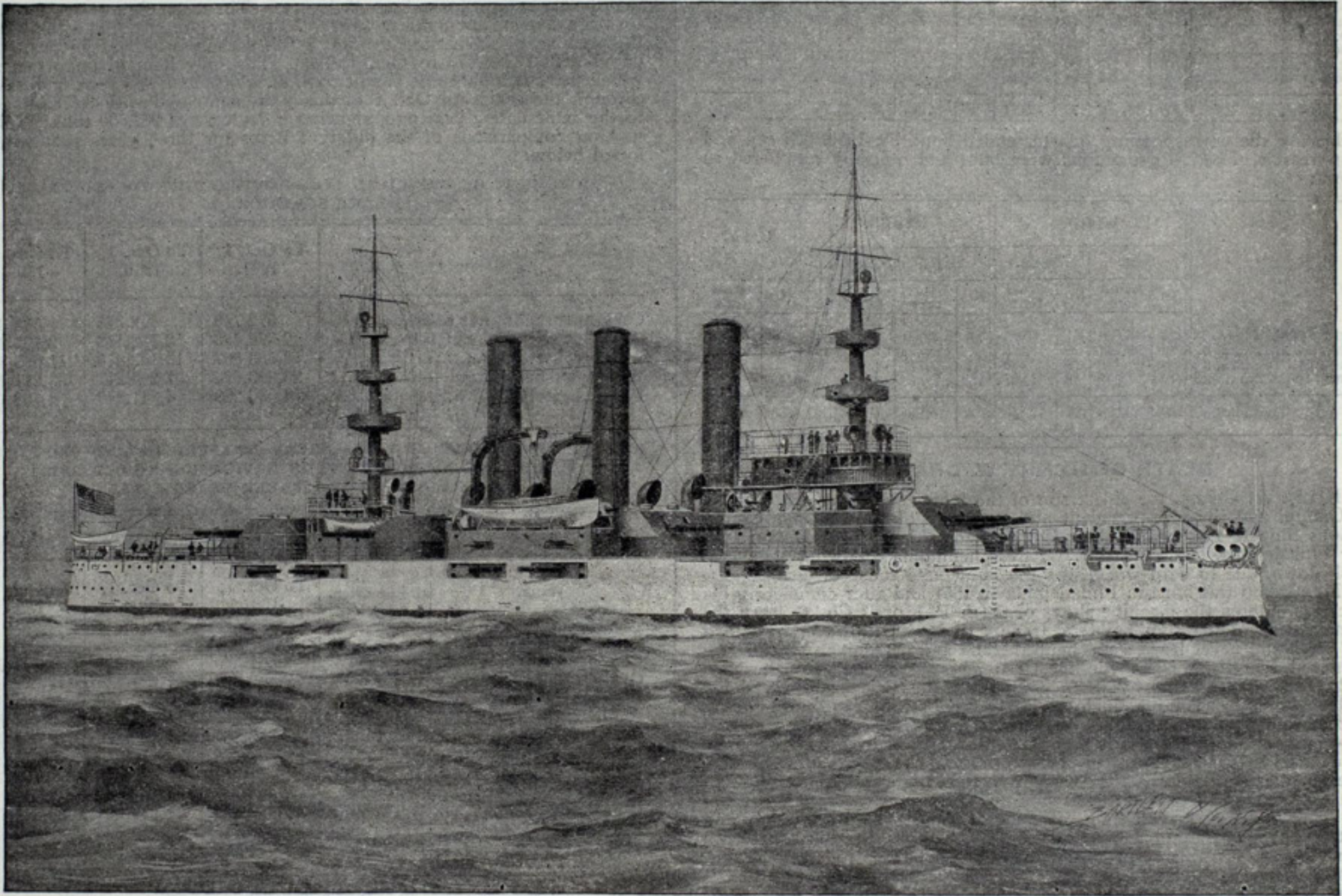
**SHIP BUILDING AT PHILADELPHIA.**

Philadelphia, Oct. 9.—The jury appointed to inquire into the cause of the explosion of the locomotive boiler on the steamship City of Trenton, "owing to conflicting testimony," were unable to fix the responsibility. The verdict stated, as their opinion, that the disaster, which cost twenty-four lives, was due to the crown sheet of the boiler becoming overheated. The other findings are of interest:

That the form, material and design of the boiler was in accordance with the printed regulations as contained in Form 2101 and approved by the secretary of the treasury in 1901; that the inspection of this boiler had been as complete as the limited force employed by the government in this territory would permit; that we consider the number of men employed by the government for this work in this district entirely too inadequate to secure the best results and recommend that the attention of the secretary of the treasury be drawn to the matter so that a remedy be provided as soon as possible; that we do not approve of the operation of a boiler

cleaned the latter was found to be a well tempered blue. No better testimony as to its condition just previous to the explosion could possibly have been obtained. The crown sheet was so hot that when, after its collapse the boiler was blown into the Delaware river, the contact with the cold water cooled the sheet almost instantly and it held the color as well as a chisel tempered by a blacksmith. An additional proof of low water was afforded in the fact that the check valve on the starboard boiler, which remained in the boat, undamaged, was closed, while that on the one in question was wide open. Every effort was being made after the discovery of low water to force in an additional supply as soon as possible. If this had been a locomotive boiler on the road it would have been a perplexing case. The overheated crown sheet would then have cooled of its own accord and very slowly. In this instance, however, it was thrown into the cold river and its condition instantaneously recorded. There is great dissatisfaction over the verdict but in all probability there will be no further investigation.

The Cramp company has a novelty at present in a wonderfully staunch old steamship which they are supplying with new boilers at their ship yard. The Niagara of the New York and Cuba Mail Steamship

**Types of the New Navy.**

UNITED STATES BATTLESHIP NEBRASKA.  
Building at Moran Bros. Co., Seattle, Wash. Fitted with Babcock & Wilcox water-tube boilers, 19,000 I.H.P.

of such a design and location with a bridge wall located in the fire box in the manner employed in this boiler, especially when using forced blast on the fires; that if such construction is approved and used we recommend that the fusible plug should be placed in the center of the corner sheet transversely and directly over the bridge wall; that the requirements of the United States government rules concerning fusible plugs were not complied with.

The jury, composed of prominent designers and builders of boilers, was engaged in the examination of the exploded boiler for nearly a week. It was believed that the exact cause of the explosion would be clearly defined and that the responsibility would be placed where it belonged. There is a consensus of opinion in local shipping circles that an injustice has therefore been done the builders of this boiler. Negligence was the cause of the explosion. This was demonstrated by a private examination made of the boiler at Neafie & Levy's ship yard, after it was recovered from the Delaware river. The investigation, which was made merely in the interests of science, was conducted by S. C. Custar, a well-known boiler expert, formerly for many years with the Baldwin Locomotive Works, and now with the Pennsylvania Salt Works Manufacturing Co. of this city, and by Robert H. Rogers, formerly master mechanic of the Pittsburg division of the Baltimore & Ohio Railroad and member of its board to investigate accidents to locomotive boilers. They found the outer shell of the boiler intact, the tubes and radial stays in good condition and no rupture evident in the water legs. The crown sheet was torn directly downward and away from the front of the tube sheet. While there were some minor defects to criticize in the arrangement of the stays there was nothing evident to warrant a disaster so extensive. The damaged crown sheet, however, told its own story as graphically as though it were endowed with speech. When the surface of its metal was

Co.'s fleet was built at Chester in 1877 and her present boilers have had twenty-four years' service. As the Niagara has made more miles than any vessel of the Ward line fleet, this is thought to be a record for enduring service. A new tail shaft is also being put in while the ship is here. Like the boilers this is its first renewal, and it is still in good condition. There is not the least sign of decay about the framing or hull of the ship, a mute tribute to the good work turned out by the Roachs.

The Russian battleship Retvizan sailed yesterday on her official trial trip. It will be run between Cape Porpoise and Cape Ann, off the Massachusetts coast, and the contract speed of 18 knots an hour must be maintained during twelve consecutive hours steaming. As a preliminary to the trip the battleship will be docked at the Brooklyn navy yard and her bottom will be cleaned and painted. She will then proceed to Boston where she will be joined by the inspecting officials and invited guests. The builders express the utmost confidence in the result. The Retvizan carries a picked crew of 350 men under the personal supervision of Edwin S. Cramp, superintending engineer of the company. She is likely to be at sea for a week before returning to this city.

The steamship La Grande Duchesse, before reported sold to the Ocean Steamship Co., will be brought to Roach's ship yard, Chester, for changes in her machinery before she enters into the service of the company between New York and Savannah. The steamship Hawaiian, now at this port, will also be sent to Roach's yard for an overhauling preparatory to sailing for San Francisco and Honolulu.

The two American liners, Finland and Kroonland, building at Cramps, will be ready for launching in a few weeks. Both vessels are 580 ft. long, 70 ft. beam, 30 ft. depth of hold, with a gross register of 12,000 tons, and are intended for the New York, Southampton and Antwerp service.



**PACIFIC MAIL LINER SIBERIA TO BE LAUNCHED.**

Newport News, Va., Oct. 9.—The new steamship *Siberia*, sister ship of the *Korea*, both of which are building here for the Pacific Mail Steamship Co., and which are very large vessels, will be launched at the ship yard Saturday, Oct. 19. The selection of the date for this important event has been officially announced at the ship yard. When the *Korea* was launched, March 23 last, a crowd numbering about 25,000 saw the monster craft go overboard. It is expected that another large crowd will come to Newport News on the occasion of the *Siberia* launching and it is possible that they will witness a double event, as rumor has it that the new and last Morgan liner, *El Alba*, will be launched at the yard on the same day. *El Alba* is the twelfth large steamship built here for the Morgan line's fleet of fast coastwise steamships.

The *Siberia* and the *Korea* will ply between San Francisco and Hong Kong with Honolulu, Yokohama and Nagasaki as ports of call. The vessels are exactly alike and the contract price for the two is \$4,000,000, making them the costliest as well as the largest merchant vessels built in this country to date. Uncle Sam is building costlier warships, but not even the monster battleship *Virginia* and the long, armored cruisers

inverted, direct-acting type, placed abreast of each other in water-tight compartments. The engines are designed to develop 18,000 I.H.P. running at the rate of eighty-six revolutions a minute.

**TO DEVELOP MINERAL PROPERTIES IN LABRADOR.**

That capitalists are reaching out to control all the available iron ore beds is evidenced by the following article from the Canadian Manufacturer regarding researches in Labrador:

Labrador is now attracting the attention of mining capitalists, and its exploitation on a large scale may be looked for ere long. While it has not been known so far as to have any gold deposits, it does possess iron beds and pulpwood areas of perhaps even greater value than the Klondike's wealth, and certainly more accessible. Labrador occupies a portion on the eastern face of the continent akin to that occupied on the west by the Yukon territory, but for four or five months of the year Labrador can be reached easily by the mail steamers plying from this port. The territory is vast—half as large as Europe—and settled only along the coast line by about 3,000 Newfoundland fishermen and as many Eskimos. Scattered bands of Montagnais Indians roam the interior, estimated at about 5,000

**Types of the New Navy.**

UNITED STATES ARMORED CRUISER CALIFORNIA.

Building at Union Iron Works, San Francisco, Cal. Fitted with Babcock & Wilcox water-tube boilers, 23,000 I.H.P.

Maryland and West Virginia, which were recently contracted for, will approach the dimensions of the Pacific Mail leviathans. The *Siberia* has a displacement 3,600 tons greater than that of the battleships of the *Virginia* class. With a speed of 20 knots the *Siberia* and *Korea* will be the fastest vessels on the Pacific. In them the Pacific Mail will have the most palatial steamers traveling out of San Francisco or entering Hong Kong, completely equipped both for heavy passenger and freight traffic. The *Korea* is nearly ready to be turned over to her owners and in a few months will leave on her long journey to the Pacific ocean. She will probably go directly from here to New York, then to Hong Kong by way of the Mediterranean, and then across the Pacific to San Francisco, touching at Honolulu on the way. Thus her maiden voyage will be into San Francisco and not out of that port.

Both ships will be required to make at least 18 knots, although the probability is that they will make 20 knots easily. The dimensions of the ships are: Length, 572 ft. 4 in.; beam, 63 ft.; depth, 40 ft.; draught, 27 ft.; displacement, 18,600 tons. The only American-built ships which approach the *Siberia* and *Korea* in size are the American liners *St. Louis* and *St. Paul*, which were built at Cramps, Philadelphia. Their dimensions are: Length, 535.5 ft.; beam, 63 ft.; depth, 26.8 ft. Their displacement is not nearly so great as that of the Pacific Mail liners.

In the construction of the *Siberia* and *Korea*, accommodations have been provided for 200 first-class passengers, thirty white steerage passengers and 1,200 Chinese. Quarters for the Chinese are arranged so that the space may be utilized for other purposes if unoccupied. The hulls are constructed of the best steel throughout and a double bottom extends from stem to stern. There are four decks, extending the whole length of the ships, known as the lower, main, upper and promenade decks. The main engines are two four-cylinder, quadruple engines of the vertical,

in all, who trap and chase deer and other animals. A few explorers who have journeyed through parts of this region have returned with glowing accounts of its mineral and timber wealth, and now the tide of capitalistic interest is setting in that direction. Newfoundland governs the eastern slope and supplies the only convenient method of reaching the coast. Canada controls the western half, whence no development is possible save by way of Hudson's bay and strait.

The most significant indication of the trend of commercial expansion as to Labrador is that A. P. Low of the Dominion geological survey, the only Canadian scientist familiar with the region, has been induced to resign his post to accept a place with a Philadelphia syndicate at a salary of \$10,000 a year, to explore and locate mineral deposits in the Labrador peninsula. The syndicate plans for operations on a large scale along the great rivers which seam the region, and looks for a big return on its investment. Mr. Low and party are now on their way from Ottawa to Montreal, where they will join the mail steamer which runs along the Labrador coast during the summer months, and which will convey them to the locality where their prospecting will be set on foot. This is not, however, the only expedition proceeding there this season. Mr. Clergue of Ontario, who is inaugurating immense industrial enterprises in the northern part of the province, has arranged for the steamer *Glencoe* to take a large exploring party up through Hudson's bay to determine if a trade outlet by that waterway can be maintained successfully. He is now proposing to capitalize his several properties into a corporate concern with a stock list of \$120,000,000, and if it can be shown that there is a marine route in this direction which will enable the company's products to be shipped direct, it will considerably improve the prospects of the proposed corporation. His party will likely remain in the region until late in the fall so as to prospect the territory thoroughly.



### STEAMER FOR THE WEEMS STEAMBOAT CO.

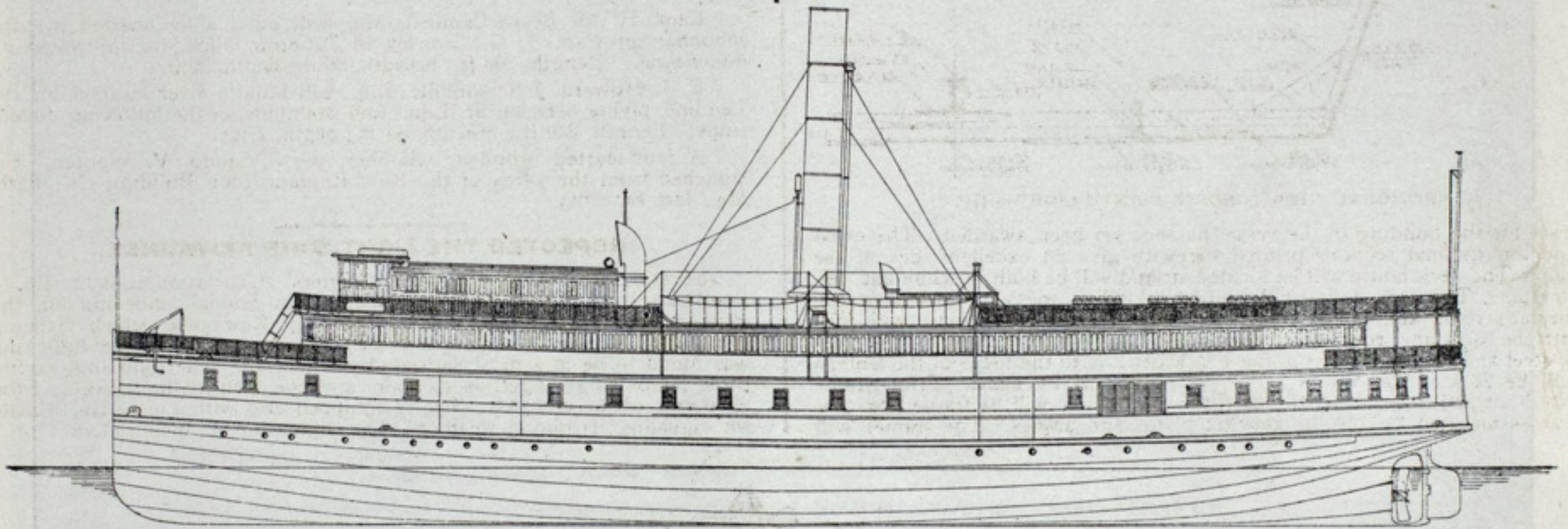
The steamer which the Neafie & Levy Ship & Engine Building Co. of Philadelphia is building for the Weems Steamboat Co. will be equipped with all improvements necessary in a first-class freight and passenger steamer for Chesapeake bay service. The vessel will be a single-screw steamer of the following dimensions: Length over all, 190 ft.; beam, molded, 40 ft.; depth to top of beam at center, 11 ft. 6 in. from base; draught from bottom of bar keel, 8 ft. with 200 tons of freight and 60 tons of coal in bunkers; speed 13 miles per hour. She will be equipped with one compound surface-condensing engine of the vertical, inverted type with cylinders 20 and 40 in. in diameter and a stroke of 28 in., arranged fore-and-aft and having cranks set at right angles with each other. All pumps are to be independent. The centrifugal pump will be of the Neafie & Levy improved type, driven by an independent engine. There will be one boiler of the Scotch type, 14 ft. 9 in. long and 12 ft. wide, fitted with four corrugated furnaces of 43 $\frac{3}{4}$  in. outside diameter, two combustion chambers 40 in. deep, one to each pair of furnaces, and about 340 3-in. tubes, each 8 ft. 9 in. long.

### SHIPPING AND SHIP BUILDING IN SCOTLAND.

Glasgow, Sept. 22, 1901.—American readers would be well advised to season with a good many grains of salt the various stories that are being circulated with regard to reputed shipping deals. The gossip-monger has "deals" on the brain in connection with shipping, just as he has "combines" on the brain in connection with coal, iron and steel. As a matter of fact, ship owning is a far from remunerative business just now, and there are dozens of owners who would be devoutly thankful if Mr. Morgan, or Mr. Ellerman or any other good angel of the capitalist order would

sail and steam, with an aggregate of 243,063 tons, as against 593 vessels and 210,755 tons in the corresponding portion of the 1900, and 320 vessels and 220,365 tons in the corresponding portion of 1899. These figures include vessels of all sorts and sizes, from battleships to barges, and from cruisers to cutters. The money value of what our ship builders have handed over to foreigners this year so far is £6,126,202, as against £4,843,453 last year, and they have still lots of foreign orders on their books.

As an instance of the specialties supplied from this river to countries and colonies abroad take the Teredo, which has just been launched by Wm. Simons & Co., Ltd., Renfrew, for the government of Natal. This is a twin-screw, stern-wheel, bucket-ladder, hopper-dredger, measuring 200 ft. in length, 38 ft. in breadth, 15 ft. 9 in. in depth, with a hopper capacity of 800 tons. The hull is divided into eleven water-tight compartments carried up to the main deck. For propelling power she has two sets of tri-compound, surface-condensing engines to develop a speed of 10 knots. Steam is supplied by two multi-tubular steel boilers, working at a pressure of 160 lbs. Engines and boilers are located aft of hopper space and the boilers are arranged in separate stokeholds adjacent to the engine room so as to obviate a long stretch of tunnel shafting. Each of the engines may be adapted to work the dredging gear, independent of the other. The Teredo is also supplied with electric light, steam steering gear, a 7-ton derrick crane, etc. She can dredge to a depth of 40 ft. and is designed for harbor work at Durham, Natal. Another of the same type of 1,200 tons is also being built by Simons & Co. for the Natal government. The Teredo, it should be mentioned, was launched stem foremost, with steam up and ready for sea. The same firm has also built for the Natal government a suction-pump, pontoon, embanking dredger. This curious craft is fitted with a compound, surface-condensing engine, coupled direct to a centrifugal sand suction pump, capable of raising



STEAMER BUILDING AT WORKS OF NEAFIE & LEVY FOR WEEMS STEAMBOAT CO.

only come and buy them up stock, lock and barrel. Anyone who will study the freight lists and then sum up the amount of tonnage in course of construction in the world, must come to the conclusion that no one—not even a millionaire—need be in a hurry to buy ships just now, either singly or by the dozen. The output of new ships this year will be a record one, and Scotch and English builders are well booked already for the most of the next year. Makers of steel material would like to put up prices, being themselves well booked, but are held back by the actuality of German competition and the probability of American competition. And ship builders are chafing under the fact that wages are still as high in the ship yard and engine shop as when several pounds per ton more were being paid for ships than is now obtainable.

The experience of Palmers Ship Building & Iron Co., Ltd., as related the other day to the shareholders, is that of every other shipbuilder. Even at the high wages which are being paid, it is difficult to get men to work regularly. With holidays, lost time in pay week, and enforced idleness during bad weather, it is doubtful if ship yard hands really work more than half the year. Costs are enormously increased by the amount of lost time, which even the trade union bosses are alarmed at, but seem now powerless to check, after encouraging in the men the propensity to do as little as possible for their money. Palmers company are iron and steel makers as well as ship builders. They report that iron ore and coke are 11 per cent., pig iron 20 per cent., coal 20 per cent., and wages 20 per cent. higher than when plates and angles were selling at the present equivalent.

One steel company of Scotland, largely engaged in the manufacture of ship building material, has just presented a most unsatisfactory report to shareholders on the result of the past year's operations. They have had to struggle with abnormally high prices for raw material and a low and falling market for their finished products. During the last two years the coal bill alone of this company has been £86,000 over previous averages. The chairman of this company declares that they are not apprehensive of competition from America, but that they are seriously concerned about actual and prospective competition from Germany. The actual competition is due to the extreme industrial depression in Germany itself, forcing iron and steel makers to offer their surplus abroad for practically anything they can get. The prospective competition will result from the fiscal system, which is planned for the encouragement of the export trade at the expense of the home trade. It is not all German home trade, however, that is sacrificed to foreign business. The ship builders are protected and supported in a variety of ways and British ship builders are by no means unmindful of the growth of ship building abroad. And yet we are always building very largely for foreigners—even for Germany. Last month, for instance, we exported twenty-three new steamers of 37,736 tons, and seventy-six new sailers of 1603 tons. In the eight months ending August we exported 553 vessels,

300 to 400 tons per hour, and of discharging the material to a distance of 600 ft. from the side of the dredge.

Now contrast with these craft the Corfe Castle, launched on the other side of the river from the old established yard of Barclay, Curle & Co., Ltd. The Corfe Castle is a steel screw for the Union Castle line of South African steamers managed by Sir Donald Currie & Co. She measures 413 ft. in length, 48 ft. 9 in. depth, moulded. She is of 4,660 tons gross, with a carrying capacity of 7,000 tons dead weight, and she is of the spar-deck type, with poop, bridge and gallant forecastle. In a cellular double bottom water ballast can be carried fore-and-aft, and there is also a deep tank abaft the engine-room for trimming purposes, when she is running light. Double derricks and winches are fitted to each hatch and all appliances throughout for operating cargo are of most complete and perfect description. The builders also supply the engines, which have cylinders 27 in., 43 in. and 72 in. diameter by 48 in. stroke, supplied with steam by three single-ended boilers, working at 180 lbs. pressure and fitted with Howden's forced draft. The Corfe Castle is, of course, one of the cargo boats, not the mail boats, of the ever-growing Union Castle fleet.

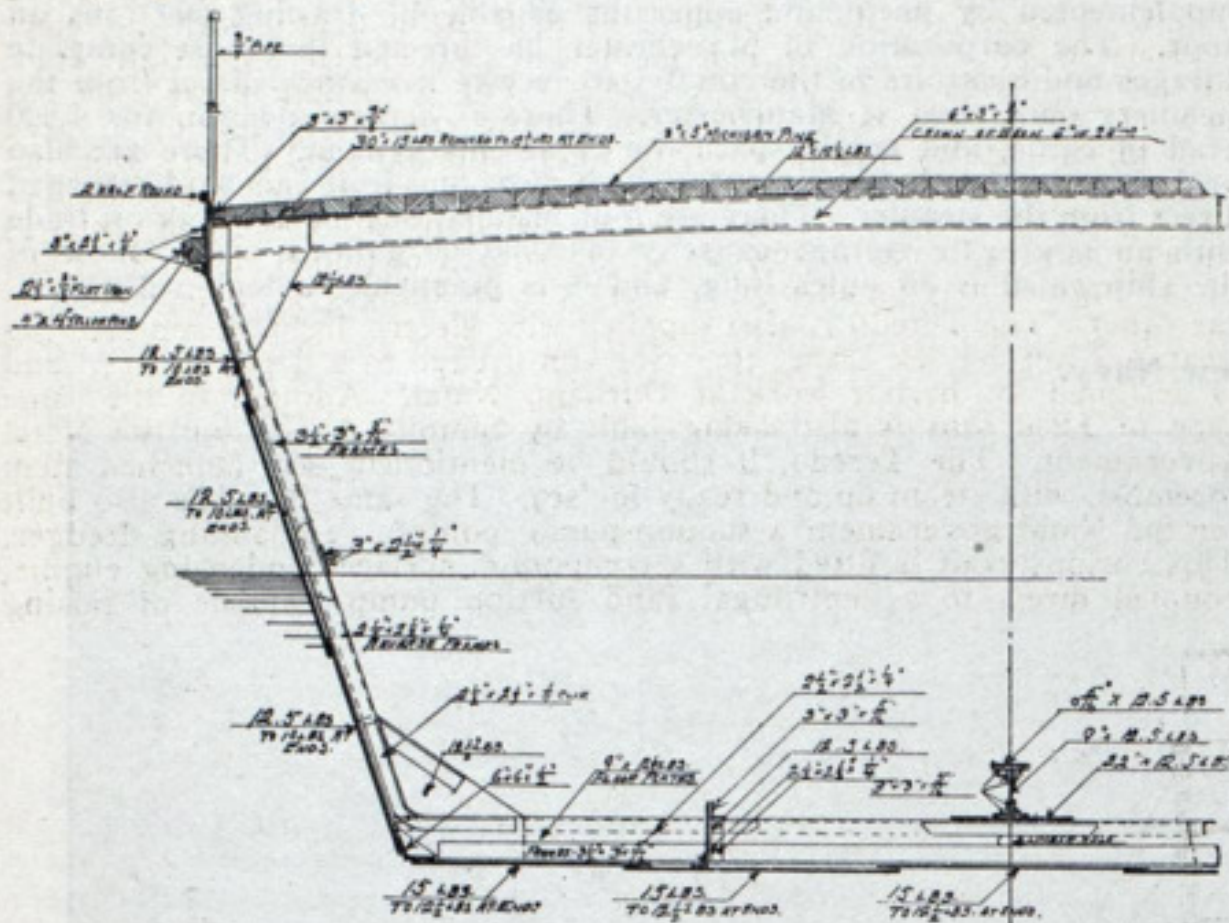
Probably the largest fleet of ocean tramps in the world is owned and managed by Messrs. Maclay & McIntyre of Glasgow. Scarcely a month passes but an addition is made to it. A few days ago Messrs. D. & W. Henderson & Co., Ltd., Glasgow, launched for this fleet a steel screw cargo boat, 393 ft. in length, 50 ft. in breadth and 28 ft. 8 in. in depth, with a gross tonnage of 4,500. The vessel is fitted with all latest improvements for the rapid and safe hauling of cargo in any port. She has seven powerful winches and several large derricks at the hatches. She has a set of triple-expansion engines with cylinders 25, 41 and 67 in. diameter by 4 ft. stroke, and two large single-ended boilers working at a pressure of 175 lbs. The steam steering gear is fitted amidships. This is a type of boat Clyde builders can turn out by the hundred.

The Williamson Bros. Co., engineers, of Philadelphia, have contracted with the Eastern Ship Building Co. of New London, Conn., to furnish two large electric steering gears for the mammoth Pacific liners building for the Great Northern Steamship Co. These steering gears are of the Pierre & Wilson type, operated by the Electro-Dynamic Co.'s patented electric gear. A special electric motor generator, or booster, will be located in the engine room, and the installation contemplated has been said to be the finest ever placed on board ship. There will be a large spare tiller on the rudder stock, which will have both hand and steam power as an auxiliary method of steering, and the main gear, besides being electrically operated, will have a large steam engine in reserve, ready to be connected up in case of emergency. Hydraulic telemotors connect the valves of the steering engines with the upper and lower navigating bridges amidships. The value of the gear is about \$50,000.



## LIGHT-SHIP FOR GROSSE POINTE.

Com'dr Joseph C. Wilson, in charge of the eleventh light-house district with headquarters at Detroit, recently advertised for bids for the construction of steel light-ship, No. 75, for service at Grosse Pointe. Only two bids were received. Johnston Bros., Perrysburg, Mich., offered to do the work for \$14,895. The Jenks Ship Building Co., Port Huron, Mich., wanted \$15,000 to build a 75-ft. boat. The limit of the congressional appropriation is \$15,000 and the specifications call for a vessel of the following dimensions: Length over all, 83 ft. 9 in.; beam, molded, 24 ft.; depth from top of keel to top of beam, amidship, 10 ft. The con-



SECTIONAL VIEW, GROSSE POINTE LIGHT-SHIP.

tract for the building of the vessel has not yet been awarded. The cross and longitudinal sections printed herewith give an excellent idea of the ship. The deck house will be located aft and will be built of white and yellow pine. The deck house will contain a kitchen, mess room, bath room, master's room and three staterooms. The forward deck house will contain the fog signal room and a lamp room. The lantern mast will be built of steel and the distance from the 4-ft. water line to the focus of the lantern will be 25 ft. The frames are to be spaced 24 in. apart. From frame No. 3 aft and from frame No. 35 forward the ends will be framed by cant frames fastened by 12 1/2-lb. bracket plates and angles. The frames will

## SHIP YARD NOTES.

Mr. Alexander Fabbri has placed a contract with the Townsend & Downey Ship Building & Repair Co., New York, to build from designs of Cary, Smith & Barber a steel auxiliary schooner yacht 77 ft. on the water line. The yacht will be, when completed, one of the most elegantly finished of her class and will reflect credit on the American yachting fleet. The Townsend & Downey company has also under construction two large steel yachts, one for the German emperor, 120 ft. on the water line, from designs by Cary, Smith & Barber, and one 110 ft. on the water line for Mr. Gibson Fahnestock of New York from designs by Theodore Ferris.

The W. & A. Fletcher Co., Hoboken, N. J., has received a contract to build a new ferry boat for the Pennsylvania Railroad Co. Thomas S. Marvel & Co., Newburgh, N. Y., will build the hull. The vessel will be named the Newark and is to be of steel with five water-tight bulkheads. She will be 206 ft. long, 65 ft. beam and 17 ft. deep. Her engines will be of three-cylinder type and her boilers will be allowed a pressure of 225 lbs. per square inch. The cabins are to be finished in mahogany with floors of rubber tiling.

George A. Gilchrist, Belfast, Me., has just signed a contract to build a steam dredger for the United States. The dredger will be 185 ft. long, 41 ft. beam and 22 ft. deep. The contract price is \$125,000. Engines and boilers will be furnished by the Bath Iron Works, Bath, Me. The dredger will be of the type known as sand-sucker.

The James Reilly Repair & Supply Co. of New York launched at the ship yard of James Bayles & Co., at Port Jefferson, L. I., a few days ago, the steamer Hydrographer for the United States coast and geodetic survey. The vessel is 100 ft. long on the water line, 19 1/2 ft. beam and 10 1/4 ft. deep.

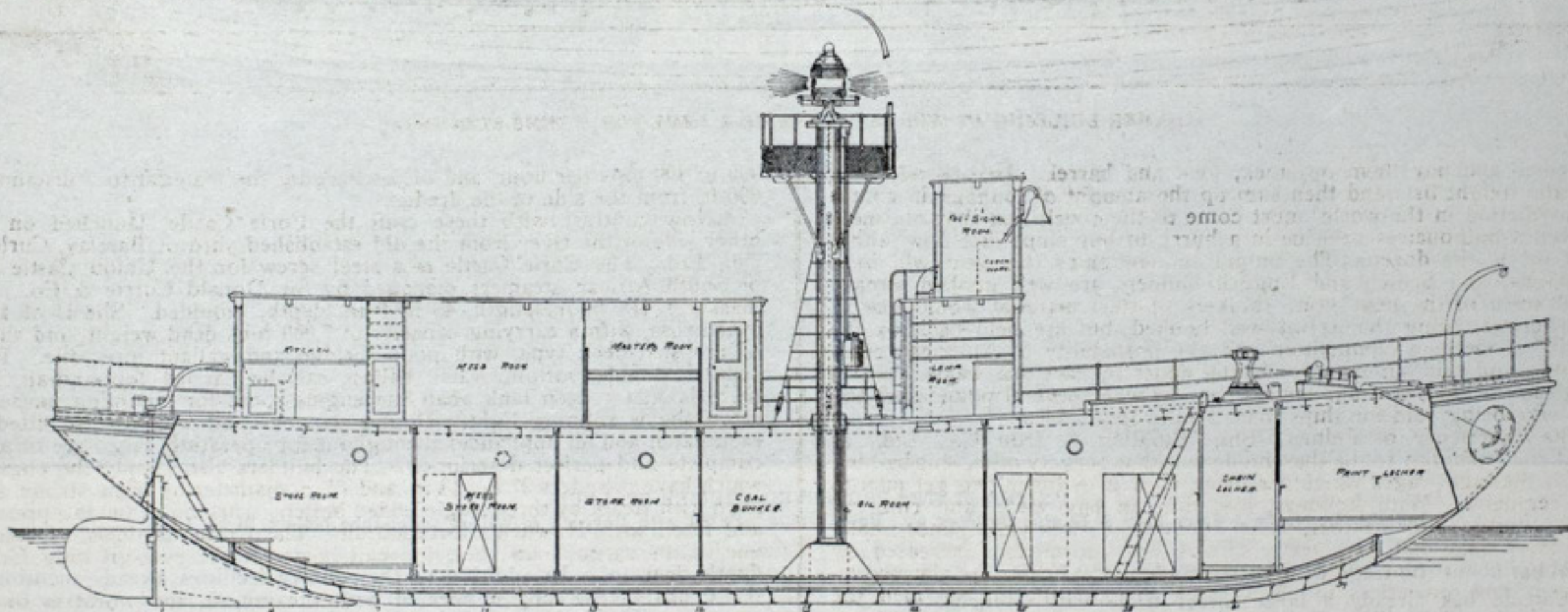
Capt. H. M. Bean, Camden, Me., will build a five-masted wooden schooner for Capt. J. G. Crowley of Taunton, Mass., of the following dimensions: Length, 260 ft.; breadth, 36 ft.; depth, 22 ft.

E. J. Howard, Jeffersonville, Ind., will build a river steamer for the Lee line, plying between St. Louis and Memphis, of the following dimensions: Length, 250 ft.; breadth, 44 ft.; depth, 7 ft.

A four-masted wooden schooner, the Orlando V. Wooten, was launched from the yards of the New England Ship Building Co., Bath, Me., last Saturday.

## INSPECTED THE LIGHT-SHIP KEWAUNEE.

Several members of the Lake Carriers' Association took a trip to Southeast shoal, Point au Pelee passage, on Sunday morning on the gunboat Hawk and inspected the light-ship Kewaunee, which is being maintained by the Lake Carriers. Everything on board the light-ship was found to be in a most satisfactory condition. The light-ship carries three lamps so arranged as to make a single blended light visible from all points of the compass. She is equipped also with a powerful whistle for signaling in foggy weather. The light-ship is anchored in 6 or 7



UNITED STATES LIGHT-SHIP NO. 75, FOR GROSSE POINTE ON THE GREAT LAKES.

extend to deck stringer plates and be cut at the angle forming the connection between the sides and bottom. The center keelson will consist of a horizontal plate 22 in. wide by 12 1/2 lbs., four angles 3 in. by 3 in. by 5-16 in., a rider plate 6 5-16 in. by 12 1/2 lbs., and one vertical plate 9 in. by 12 1/2 lbs. The intercostal keelsons will consist of a vertical plate 12 1/2 lbs., one angle 3 in. by 3 in. by 5-16 in., and two clips 2 1/2 in. by 2 1/2 in. by 1/4 in. There will be twelve stanchions, extending from deck beams to keelsons, riveted to top and bottom. The deck planking will be of Michigan pine. Anchors, chains and lamps will be furnished by the light-house board.

## ELECTRIC STEERING APPARATUS.

That the advantages of steering vessels by electricity is receiving a great amount of attention is evinced by the fact that although the Pfaticher system has been before the public only a little over a year, the Electro-Dynamic Co. of Philadelphia reports having orders to equip eleven vessels of an aggregate of 110,000 tons displacement. The Eastern Ship Building Co. of New London, Conn., after a careful investigation, has adopted the Pfaticher system for the two mammoth vessels building for the Great Northern Steamship Co. The Electro-Dynamic Co. has prepared a pamphlet describing this system, which may be had on application.

fathoms of water and all vessels should pass to the south of her. A few have passed to the north, but have come so close as to nearly foul her anchor chain. There is good water all about her to the south and there is no reason why vessels should attempt to hug her in passing. The fitting out and purchase of this vessel has cost the Lake Carriers' Association about \$14,000 so far. Its maintenance, exclusive of repairs, is costing about \$250 per month. The United States light-house board is now considering the advisability of building either a light-house or maintaining a light-ship upon this shoal and thus relieving the Lake Carriers from supporting what is purely a governmental burden. Capt. George P. McKay, chairman of the committee on aids to navigation, has furnished the government officials with all the necessary facts in the case. A light-house would, of course, be preferable to a light-ship upon this shoal, but there is some question as to whether the nature of the bottom would permit a foundation to be built upon it. The passage is in Canadian waters, which explains the indifference manifested by the United States government to its dangers. However, as the Canadian government already maintains lights in American waters frequented by its ships, the American government should maintain a light upon this passage, as the commerce which utilizes it is almost wholly American.

John C. Fitzpatrick, well known in lake marine circles, is now proprietor of the Hotel California, Los Angeles.



### PROGRESS OF MANCHESTER SHIP CANAL.

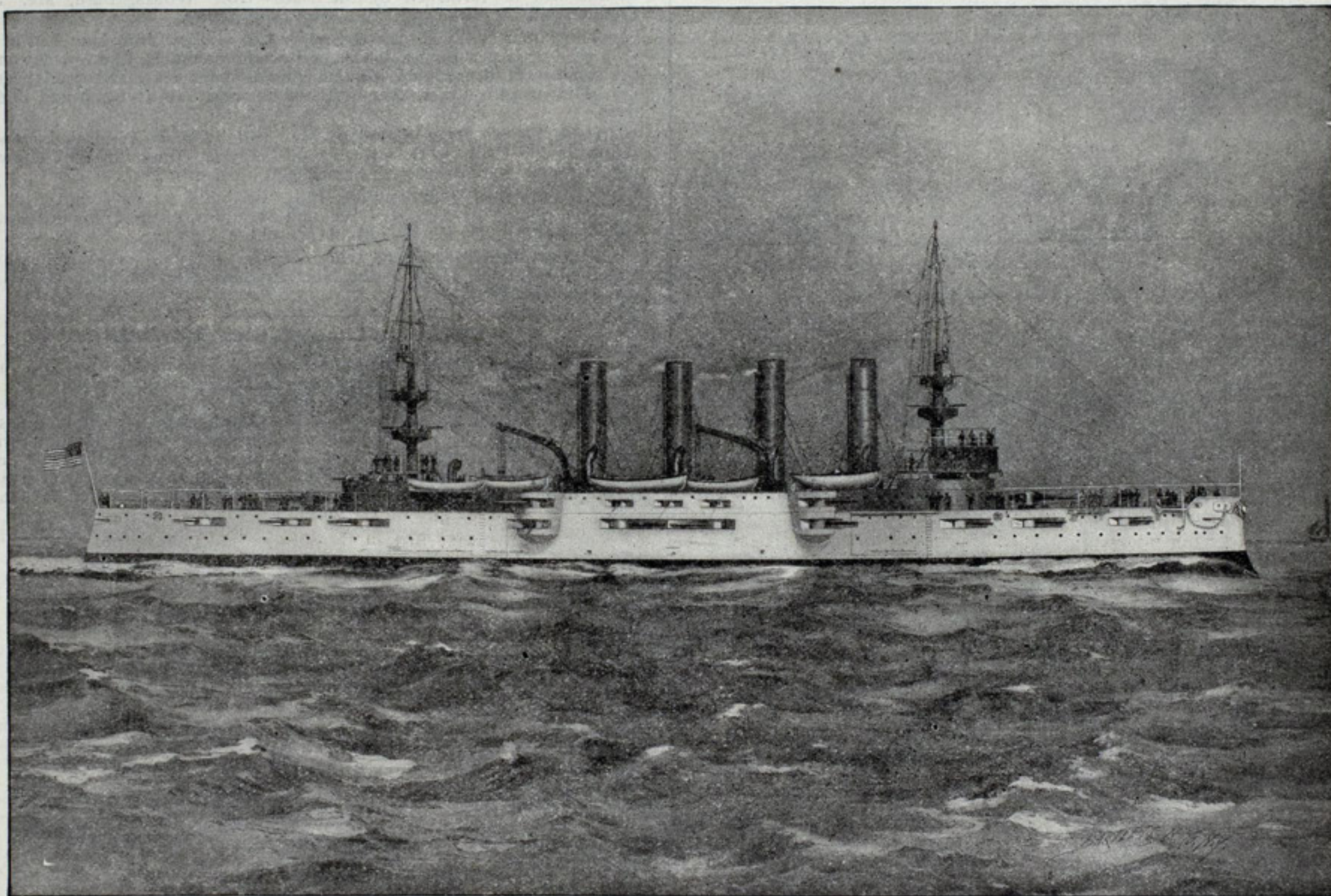
Mr. Herbert M. Gibson, chief traffic superintendent of the Manchester Ship Canal Co., is at present in this country in an endeavor to further the development of direct trade from Canadian and American ports to the port of Manchester. Discussing the situation in Montreal, he said:

"The ship canal and docks have been constructed at a cost of upward of £14,000,000. The canal enables large steamers to go direct to Manchester, saving the expense of upward of thirty miles of transit of merchandise by rail from or to Liverpool. Manchester has a large and growing trade, the weight of merchandise last year using the ship canal amounting to more than 3,000,000 tons. Regular services of steamers have been running for some years from New York, Savannah, New Orleans and Galveston to Manchester. There have also been sailings from Baltimore, Newport News, Charleston, Brunswick, Ga., Mobile and Pensacola. Arrangements have been made for other lines. A direct service of fast, high-class steamers between Philadelphia and Manchester to be run jointly by the Manchester Liners, Ltd., and the Leyland Shipping Co., Ltd., of Liverpool, is just commencing."

The facilities for despatching traffic to all parts from the docks direct by rail, give Manchester great advantages. Not only is there a considerable monetary saving, but the handling of the cargo is reduced to a minimum, by being loaded direct from ship to railway, where destined for interior towns. Summarizing the equipment of the docks, Mr. Gibson said:

"There are upward of 100 hydraulic and steam cranes of from one to 10 tons capacity; also a 30-ton crane. The new transit sheds for the receiving of cargo from ship have fine floors. There is a grain elevator with a storage capacity of 1,500,000 bushels. The marine leg, which will discharge grain from full holds at the rate of 350 tons an hour, has been supplemented by pneumatic apparatus capable of drawing 200 tons an hour. The corporation of Manchester has erected the most complete lairages and abattoirs in the country to receive live stock direct from the steamers on arrival at Manchester. There is accommodation for 1,000 head of cattle, and ample space for great enlargement. There are also cold air stores at the docks, into which meat and fruit can be discharged direct from the steamer. There are four installations for the tank oil trade with an aggregate storage capacity of 2,000,000 gallons. The whole of the ship canal is 35 miles long, and it is practically a lock with 26 ft.

### Types of the New Navy.



UNITED STATES PROTECTED CRUISER ST. LOUIS.

Building at Neale & Levy Ship & Engine Building Co., Philadelphia. Fitted with Babcock & Wilcox water-tube boilers, 21,000 I.H.P.

"What about the trade with Canada?"

"Canada has already a large direct trade with Manchester," Mr. Gibson replied. "The Manchester Liners, Ltd., have for upward of three years run a regular frequent service of large, fast steamers to Manchester from Montreal and Quebec in the summer, and Halifax and St. John in the winter. Some of the vessels employed in that service have a dead weight capacity of 8,500 tons, have accommodation for about 700 head of live cattle, and are fitted with cold storage. The operations of the line have been very successful in opening up an increased outlet for Canadian produce."

"In addition to the lines of steamers from Canada and the United States, lines of steamers are now trading regularly between Manchester and Australia, the Persian Gulf, Bombay, Syria, Egypt, and all the principal ports of Europe. It is also receiving large importations of grain in full cargoes from the western parts of the United States and from the River Platte. The importation of timber from Canada and the United States ports has assumed large proportions."

Mr. Gibson then mentioned cases showing the cost of forwarding merchandise to the consumers ex ship in the Manchester docks, as compared with ex ship Liverpool. In the case of the Vienna, from New York, with a mixed general cargo of 5,878 tons, the total saving on the cargo equalled \$6,769, or 5.10 cents per 100 lbs. The steamship Manchester Corporation, from New Orleans, with 5,916 tons cotton and large quantities of grain and lumber, showed a saving of \$6,893, or 5.19 cents, per 100 lbs. The Manchester Port, with 6,258 tons general cargo and live stock from Montreal, \$7,229, or 5.19 cents per 100 lbs.

Mr. Gibson also gave a description of the Manchester docks, which he said are equipped with the most modern and complete appliances.

depth of water. In addition to the railway facilities already mentioned, the docks are directly connected with the inland canal systems of the country. The progress made since the opening of the ship canal is evidenced by the following figures, showing the trade year by year in net tons of merchandise: 1894, 925,659; 1895, 1,358,875; 1896, 1,826,237; 1897, 2,085,815; 1898, 2,595,585; 1899, 2,778,108; 1900, 3,060,516.

### ALGIERS DOCK SUCCESSFULLY FLOATED.

Sparrow's Point, Md., Oct. 8.—At 11:30 a. m. Saturday the great floating dry dock, building by the Maryland Steel Co. at this place for the United States naval station at Algiers, La., was successfully floated and towed out of the basin where it was constructed. The dock lifted itself so gradually off the keel blocks that those on board were not aware of the fact until the tugs had the great structure under way. After a test at the works of the company the dock will be towed to the Mississippi, where it will be placed in position and made ready for use. A full description of the dock recently appeared in these columns.

The Red Star Towing & Wrecking Co. of Boston has secured the contract to tow the dock from Sparrow's point to New Orleans.

The North German Lloyd steamer Main, which was burned in the great fire in Hoboken, and which is now rebuilding at Newport News at a cost of about \$1,000,000, is to be placed in the Baltimore-Bremen service in the near future.

It is reported that Messrs. Denny of Dumbarton have laid the keel of a new turbine steamer to replace the King Edward, which has been sold.



### THE NEED FOR AMERICAN SHIPS.

Under the title "The Need for American Ships," Mr. Eugene Tyler Chamberlain, United States commissioner of navigation, has contributed the following article to the newspapers:

In his last great speech at Buffalo, President McKinley dwelt upon several lines of policy which he declared the nation should pursue in the future, and one of these was the development of our merchant marine, and President Roosevelt, since his accession to office, has affirmed his adherence to the same view. The policy thus declared refers particularly to ships on the ocean engaged in foreign trade. American shipping, in this sense, is a national institution, or as affirmed by our supreme court, "a national service." The American ship not only carries the country's flag, but for the time being and to the extent of its deck, actually extends national territory up to the jurisdiction of the foreign nation in whose harbor it anchors. Exports, such as corn, cattle, steel beams, sewing machines and bicycles, forthwith become merged into the things of the foreign country into which they are sent. Outside of American books—encouraged by national and international copyright—I recall no thing, except the American ship, which takes with it to foreign territory its American nationality and keeps it. It is both narrow and incorrect, therefore, to put any project to develop American shipping on the same plane as a bill to establish the tinplate industry, or to promote the importation of cheaper woolen clothing, or to encourage the exportation of dairy products. All of these will concern special industries, and only indirectly and remotely effect the general growth. The development of shipping is primarily national. Even in secondary results, it reaches directly many more forms of human activity—of which ship building is but one—than any other industry now recalled.

The influence of Great Britain in shaping the world's history and growth—an influence entirely out of proportion to her population and natural resources—has radiated through her merchant shipping. Through it the English language and Anglo-Saxon ideals and methods have pervaded the world. We have only lately come to the last chapter in the history of an earlier dominion over the world which Spain held by virtue of her navigators and her ships. "Our future lies on the sea," the watchword of the Kaiser, tersely expresses the laudable ambition of Germany to attain leadership among nations. It is not an unworthy ambition to aspire to be the most powerful nation in the world, the most pervasive influence in shaping mankind's future. It is a proper ambition for Americans to entertain at the beginning of the twentieth century.

If, as we believe, our national ideals and purposes are pure and elevated, the extension of American shipping will carry with it not merely an increase of trade and an increase of wealth, but also an expansion of forces working for the general welfare of the world. Like other nations we are now sending our warships to foreign ports "to show the flag." The propriety of this course does not admit of question. The flag above the muzzles of steel guns, however, cannot consistently with our purposes or our industrial rank continue to be the only display of American colors in foreign ports. Even army transports and navy colliers, peaceful in their way, will hardly suffice as our permanent representation on the sea. What may be termed our industrial independence happens to have been attained almost simultaneously with the acquisition of Hawaii, Porto Rico and the Philippines, and our inevitable appearance in the commercial politics of Asia. The opportunity to become a maritime commercial power and the necessity for becoming such have arrived together. There is now no real question as to the need for American ships in the minds of the leaders in practical affairs in this country. That need is disputed academically by some on whom traditional theories have so strong a hold that they have not yet adjusted themselves to the principles which must govern the nation's course during this century. A relatively small but influential number find it to obvious self interest to dispute such need. Each class may have done something to confuse the issue and retard action thus far, but both together will scarcely be able long to keep the United States in its painfully absurd position on the sea.

It is a political necessity for the United States to carry all its mails to Northern Europe, Asia and Australia by American mail steamers, precisely as all the mails of England, Germany and France to the United States, Asia and Australia, are carried by the mail steamers of each nation respectively. It is a political necessity for the United States to carry its mails to South America by American mail steamers, precisely as the mails of England, Germany and France are carried to Africa by mail steamers of each nation respectively. The service is national and should be intrusted to agencies at all times under national control. Foreign ships owe and perform their first duty to the nation whose flag they fly. Whatever may have been formerly the case, we are no longer so small, weak or poor that we must bargain to get our letters carried as an incident to a British, German or French mail contract by the auxiliary cruisers of the British, German or French navies, officered and manned by their naval reserves. We do not, of course, apprehend war with any of these three powers, but that is no good reason why we should help to support their auxiliary sea forces, particularly as those three navies are the only ones, except the Russian, which our own navy does not already much outrank. Congress every year votes more money indirectly to support the British naval militia than it does for the national guard of any one of the great states of the union. By the muddy waters of improved southwestern rivers men are denying the usefulness in war of auxiliary merchant cruisers and their seamen. This year England has increased her list of such auxiliary cruisers from twenty-eight to fifty, and Germany is doubling hers. It is a case where "the shallows murmur, but the deeps are dumb."

National policy requires that our mail steamships should be built in home yards by home labor. The requirement has been recognized by every nation of the first rank as soon as its industrial growth permitted. The plant, the machinery and the skilled mechanics needed to build these ships are part of a nation's scheme of defence. Next to having a most powerful navy is the ability to construct one when required. It is to the national interest that such ships should be officered and manned, so far as practicable, by American citizens, constituting in effect a naval reserve. Federal appropriations to create a body of merchant seamen would stand more firmly on constitutional grounds than federal appropriations to arm the militia. The latter can be done through the agency of the states. The former, by our scheme of government, can effectively be done only by federal authority. These propositions concededly set commercial prin-

ciples at defiance. Our mails can be carried more cheaply by foreign than by American steamers. Ships cost less in England than in the United States. British seamen may be had for about half, and German and French seamen for less than half the wages American seamen are paid. The proposition cannot be debated on the basis of the cash balance of receipts and expenditures, for only the latter can be put down in dollars and cents. The British, German and French ocean mail services are conducted to an annual loss of millions. Like many other national needs, the need for American ships can be supplied only by the expenditure of national money without return in kind.

With obvious qualifications, what has been said of American mail steamers applies to other American vessels. Their relations to the whole nation are less direct, and, based on those relations, less expenditure proportionately is warranted. The number, speed, size, regularity and large crews of a country's ocean mail steamers indicate its greatness in a manner cargo steamers or sailing vessels cannot. With the cargo steamer and sailing vessel, the national element is secondary to the commercial. Such vessels concern mainly the grazing, grain, cotton, lumber, coal and oil producing states. American mail steamers concern those states with all the union and all its interests. The commercial phases of the need for American ships are important, but outside the scope of this article. The cool judgment of the country less than twenty years ago directed the beginning of a program of naval construction, since consistently developed and carried out. In that short time the United States has risen from almost no rank to be the fourth naval power of the world. Meanwhile, American ships, relatively and absolutely, have been decreasing. Our shipping in foreign trade is about one-third smaller than when the Chicago and Atlanta were laid down. The increase in our tonnage has been of vessels seldom, if ever, a day's run distant from the protection of our shore batteries.

The future sea power of the United States, mercantile and naval, depends upon an intelligent response to the need for American ships. The eminent writer upon the new navy asks and answers the question of commercial and military interdependence: "Can this navy be had without restoring the merchant shipping? It is doubtful. History has proved that such a purely military sea power can be built up by a despot, as was done by Louis XIV.; but though so fair seeming, experience showed that his navy was like a growth which, having no root, soon withers away."

### J. PIERPONT MORGAN AND THE WHITE STAR LINE.

The English evidently look with some suspicion upon the rumor that J. Pierpont Morgan would buy the White Star line. While the White Star officials have denied it, it is plain to be seen that the English regard it as a possibility. Note the following from *Fairplay* of London:

"Naturally a good deal of interest has been excited by the rumor that the White Star fleet was likely to be sold to the Americans. The rumor was at once most categorically denied, and the denial must be accepted without question as regards the present. For all that no one would be surprised if at a date not perhaps very distant some transaction of the kind were to take place. No American ship owner would risk his money in competition with British ship owners either in the Atlantic or in any other trade, because it is well known in America that our ship owners, in the management of steamers, are far ahead of our competitors on the other side of the Atlantic, and some years would be required before American management could be worked as economically as our own. What, however, applies to American ship owners by no means applies to American railway companies. Those gigantic corporations are full of money, in fact they have more than they know what to do with, and if they were to take it into their heads to do so they would be in a position either to buy out our fleets at tempting prices or squeeze them out. Descending from large things to small, we have an illustration of what this may mean in the management of some of our railways which also run lines of steamers as feeders for the home trade. It is well known that those steamers generally run at a loss, but the accounts are merged in the general accounts of the companies, and the steamers are supposed to make up as feeders for the lines what money is lost on their own working. Very shrewd judges are of opinion that it may not be many years before these American railways will have secured the bulk of the North Atlantic steam traffic. It is undoubtedly in their power to do so if they choose, and all indications are in favor of their going in for the business. Some people foreshadow a huge company, with well known financiers at the head of it, buying up two or three of the principal steam lines in the North Atlantic trade. It is believed that the White Star line has generally paid a dividend of 10 per cent. and that the surplus earnings have been used in extending the fleet to its present magnificent proportions. The cost of recent additions to the fleet are believed to amount to nearly £3,000,000."

### DISCUSSED THE NEW SHIPPING BILL.

Senator M. A. Hanna, Senator William P. Frye and Congressman Littlefield held a conference in Boston last week on the shipping bill. They discussed its main features but gave out no information as to what new provisions it may contain. Senator Hanna said:

"I have no hesitation in saying that I hope and believe that a subsidy bill will be considered by congress at its next session. Of course, no one can guarantee the passage of any bill, but the friends of a measure can present it for consideration. It means very little that the subsidy bill brought up at the last session was defeated, because that was the short session. You know that the democrats filibustered last spring, as they usually have done, because the session was brief. What could not be done in a short session may be accomplished in a long one."

Senator Frye, who had charge of the subsidy bill last spring, in reply to a question as to the prospects of a subsidy bill being reported at the next session, said: "I have every reason to believe that a subsidy bill will be presented to congress at its next session." Mr. Frye did not care to go into the details of the matter.

German naval authorities have decided to build a torpedo boat destroyer with a set of Parsons steam turbines for propulsion, with a view of thoroughly testing for themselves the efficiency and economy of the turbine.



# MARINE REVIEW

Devoted to the Merchant Marine, the Navy, Ship Building, and Kindred Interests.

It may be set down definitely that as far as the Isthmian canal is concerned the period of investigation is over. It has been the standing claim of canal enthusiasts that whenever they wanted legislation for a canal they got legislation for an investigation instead. The latest, however, was justifiable. A rider to appropriate \$140,000,000 for the construction of the canal was, in the last few months of congress, added to the river and harbor bill—not that they loved the canal more but that they loved the harbor bill less. Mr. Burton caused the item to be amended to \$1,000,000 for an investigation. There have been three great investigating committees within six years, the Ludlow, the Walker and the present Isthmian. The first-named two devoted themselves to the Nicaraguan route, while the present commission, availing itself of the Nicaraguan data of the Walker commission, has swept the field and seriously considered every project which has even the smallest claim to attention. Few maps are more interesting than one at the offices of the commission showing in red ink lines the various canal routes which have been at one time or another suggested. Some of them extend far into the continent of South America and by a longer route avail themselves of the rivers and natural waterways of that region. These routes have lessened in importance with the increasing size of ocean vessels and still the commission has not neglected any proposal that might perchance have some surprising possibilities wrapped up in it. The San Blas route, not many miles south of the Panama, has had, first and last, many advocates. It is the shortest link between the two oceans, and as such appeals to investigators. The present commission found, however, that there was no way of getting through its mountains except by a tunnel four or five miles long, the disadvantages of which are so obvious as to make the route wholly impracticable. Exploring parties under the commission have run many lines across the Isthmus of Darien with the conclusion that nothing can be found to compare with the two well established routes, the Nicaraguan and the Panama. The results of these minor investigations will appear in the final report. It has now been decided not to complete this report until it is necessary to submit it to congress. The commission will, accordingly, keep the data in its own hands for some time, thus affording the very fullest opportunity for the French people to submit their best and most definite proposal. The thing that seems to be sticking in the minds of the commission just now is how far to veer toward the advocacy of the Panama route. It is not denied that the fullest investigation has made it clear that, with the work already done there, provided it could be obtained at a reasonable price, Panama offers a much simpler problem than Nicaragua. Politically it might be difficult to get the Panama project, though it is conceded by many distinguished men that the common-sense plan would be to come to terms with the French owners and complete that canal.

The October number of Success contains articles from a few lake city mayors upon the need of a deep waterway to the sea, but what they all say is decidedly vague. The Hon. Tom L. Johnson, mayor of Cleveland, contributes a few hundred words, but they add nothing of value to the waterway question. It is all very well to talk of a deep waterway to the sea; it is quite another thing to construct it and to make it pay. Ship canals, as a rule, are unsuccessful. The time and care necessary to navigate a deep ship through them will absorb the profit in a cargo. Those engineers who have given it the greatest study have condemned the project of a ship canal from Lake Erie to the Hudson. The state of New York has rejected it as impractical and has favored the barge canal instead. Even the Canadian canals, with their shallow draught, have yet to prove their commercial right to exist. But this is what Mr. Johnson says, and it is certainly all right as far as it goes:

"It would seem that the United States, with its extensive coast lines on the Atlantic and Pacific, could find locations for a sufficient number of seaports to accommodate its increasing trade. But this is not so. The principal cities of the great lakes are looking forward to a salt water service that will carry their vessels to all parts of the world. Cleveland does not intend to be backward in this matter. She stands ready to grasp fortune and time by the forelocks, and to promote such projects as will point to a successful waterway to the Atlantic. Such a route is becoming more and more a necessity every day. The vastness of the commerce of the middle western states proclaims that they must have their own routes to the sea. The increase in trade with other countries will make this necessary; trade cannot be allowed to choke the channel of one or two particular ports. If even a comparatively small amount of this traffic can be moved by the employment of steam vessels, to prevent a threatened congestion of moving freight, something will have been done to solve a difficult problem. The matter of opening a route to the Atlantic is one of the great questions of the day, and affords a vast field for the engineer who claims that there is nothing new to be built in this country. It is a virgin field for those who can devise a short and practicable route to the sea. Canada has spent millions of dollars solving this problem, and America should stand ready to spend millions more. It was only last year that the Canadian government announced that vessels not over 260 ft. in length, and drawing less than 14 ft., could pass, unobstructed, through the canals from the lakes to the ocean. This was the first step in a new undertaking, typical of American progress, that promises to revolutionize the shipping interests of the great lakes and add enormously to our commercial wealth."

## "LONG-ARM" SYSTEM OF POWER DOORS AND HATCHES.

The "Long-Arm" System Co. of Cleveland, O., announce the recent publication of their bulletin No. 5, giving full data regarding the "long-arm" system of power doors and hatches for the preservation of life and property at sea. The booklet will be forwarded upon application.

## SHIP BUILDING IN BATH.

Ship building operations in the Bath customs district during the past nine months show that the great revival which began during the latter part of the late President McKinley's administration has not fallen off to any perceptible extent, and the indications promise a busy fall, judging from the amount of shipping now on the stocks. To date the amount of tonnage launched during the year is 29,338 tons, and considering the vessels on the stocks with an approximate tonnage of more than 10,000, the total will almost equal that of the year 1900, when 41,532 gross tons were built. This is exclusive of the government work at the Bath Iron Works.

All the ship yards are busy at present, and employment is given to a large number of men. At the south end yard of Gardner G. Deering is a five-masted schooner of about 2,000 tons, which Mr. Deering is building for himself, and will have ready to launch early next month. Percy & Small have a five-sticker all timbered out for themselves, and a four-masted schooner for Capt. S. G. Hupper of Rockland fast nearing completion.

Kelley, Spear & Co., builders of the four 3,000-ton barges for the Staples Coal Co. of Taunton, Mass., early in the year, have the contract for two more of practically the same design, but 1,000 tons larger. These barges are for the coal-carrying trade between the United States and Cuba. This idea was the subject of considerable conjecture when announcement of the experiment was first made, but has since opened the eyes of the credulous when the figures have been shown proving the line a good profit-earner. This firm is also getting out the frame for a four-masted schooner.

William F. Palmer of Boston is having built a five-masted schooner at the yard of the New England Ship Building Co., in which he is introducing a feature new to his vessels, but not entirely new to the shipping world. It is that of strapping the entire hull with belts of steel. Extending from stem to stern and along the gunwale line is a steel belt 8½ in. wide and ¾ in. thick, which is bolted to the frame top. Besides this, there are diagonal straps from keel to gunwale, which are strongly bolted at all intersections and also through each frame crossed by them, as well as the belt strap at the top. The benefit claimed for such a process is strength and firmness when at sea, and also the lesser liability of serious damage should the vessel strike a rock or run on a reef. The five-masted schooner William C. Carnegie and the six-master Eleanor A. Percy are strapped in a similar manner.

Besides this vessel, the New England Co. has the keel stretched for the new steamer to replace the Sagadahoc of Charles W. Morse's Kennebec & Boston line. Work upon the other two steamers for Mr. Morse, contracts for which were announced a month ago and which rumor has it are to run on the Bangor & Boston line, has not yet been commenced, and from a reliable source of information it is understood it will not be touched until spring. This firm also has the four-masted schooner Orlando V. Wootten of Baltimore about ready for sea, and she will be launched next week.

Arthur Sewall & Co. have the big ship William P. Frye about rigged, and it is expected she will be ready to go to New York with a load of sand for ballast by Nov. 15. A keel for a five-masted steel schooner, the first ever built in the country, will immediately be stretched upon the ways recently vacated by the Frye. In the south portion of the yard is the large steel ship Acme, all in frame. She belongs to the Standard Oil Co. of New York, and is to be an exact duplicate of the William P. Frye.

The evils of the recent steel strike were felt in Bath, especially by the Bath Iron Works, where work was delayed upon the government vessels. The magnificent steel yacht for A. S. Bigelow of Boston, which this firm contracted for early in the summer, is in hardly more than the embryo state at present. The keel was stretched several weeks ago, but work was suspended on account of the lack of material.

Interest is being revived in the ship subsidy bill this fall, since it is understood that when it is brought before the next session of congress, it will be so revised as to exclude foreign-built vessels from American registry, and also allowing coasting vessels engaging in foreign trade to share the bounties. Col. Edward C. Plummer of Bath has been instrumental in bringing about this change, and it is believed that he has the co-operation of Senator Hanna. When the latter was a guest in Bath, last week, the two had a consultation, and from its results the friends of both believe that their interests are mutual. Senator Fairbanks of Indiana is known to be a warm supporter of the bill under these revisions, and there are others equally prominent who will work in its behalf. An effort is being made for Congressman Littlefield of Maine to champion the bill this winter, and the chances are that it will be pushed through at the opening of congress.

## LIST OF VESSELS LAUNCHED IN THE BATH CUSTOMS DISTRICT IN 1901.

Rig.	Name.	Halling port.	By whom built.	Length. ft. in.	Beam. ft. in.	Depth. ft. in.
Barge.	Havana.	Taunton.	Kelley, Spear & Co.	240 00	43 00	19 00
Schr.	O. C. Curtis.	Portland.	Percy & Small.	265 00	46 02	22 09
Schr.	E. G. Folwell.	Clinton, Ct.	New England Co.	196 09	40 04	18 04
Schr.	M. V. Neville.	Bath.	James W. Hawley.	195 00	40 02	18 04
Schr.	Seguin.	Portland.	Frank S. Bowker.	143 07	33 05	10 09
Stmr.	Hockomock.	Bath.	William T. Donnell.	76 03	26 08	10 04
Schr.	C. S. Hirsch.	New York.	Kelley, Spear & Co.	173 01	35 05	13 03
Schr.	M. B. Seavey.	Bath.	Gardner G. Deering.	203 00	40 00	25 05
Barge.	Whitman.	Taunton.	Kelley, Spear & Co.	163 04	34 02	10 04
Tug.	Cuba.	Taunton.	Bath Iron Works.	166 00	29 04	18 09
Barge.	Matanzas.	Taunton.	Kelley, Spear & Co.	240 00	43 00	19 00
Schr.	M. P. Small.	Bath.	Percy & Small.	264 06	45 07	21 05
Barge.	Cardenas.	Taunton.	Kelley, Spear & Co.	245 09	43 02	19 00
Barge.	Rockland.	Taunton.	Kelley, Spear & Co.	163 06	34 03	10 04
Ship.	Acme.	New York.	Arthur Sewall & Co.	322 02	45 04	26 01
Schr.	Springfield.	Jacksonville.	New England Co.	172 00	36 01	13 07
Schr.	A. F. Brown.	Bath.	Charles V. Minott.	221 05	41 05	18 06
Barge.	Weir.	Taunton.	Kelley, Spear & Co.	154 00	31 03	8 06
Schr.	I. N. Carver.	New York.	New England Co.	167 06	36 00	13 04
Barge.	Sagua.	Taunton.	Kelley, Spear & Co.	245 09	43 01	19 00
Barge.	Newport.	Taunton.	Kelley, Spear & Co.	153 04	31 03	8 03
Schr.	F. W. Day.	Bath.	Kelley, Spear & Co.	172 09	35 08	13 02
Stmr.	W. G. Small.	Bath.	William G. Small.	49 03	16 05	6 05
Schr.	C. E. Hayes.	Portland.	Percy & Small.	202 05	40 03	18 07
Ship.	W. P. Frye.	Bath.	Arthur Sewall & Co.	332 04	45 04	26 02

Elliott Perry Gleason, whose death was announced from New York a few days ago, was an extensive manufacturer and was at the head of two or three concerns that are well known in marine circles. He was president of the Steam Boiler Equipment Co. and the Gleason-Peters Air Compressor Co.



## FOSTER'S FOG SIGNALS.

The problem of safety from collision at sea has rightly been divided into three parts: First, to prevent the collision; second, to save the ship in case of collision; third, in case the ship must be abandoned, to save the passengers and crew. Foster's system of fog signalling aims to reach the root of the matter by preventing the collision, and so to make provision for the second and third parts of the problem unnecessary. This is accomplished by means of a signalling apparatus which not only warns approaching vessels that they are in close proximity, but enables each to tell the other its exact compass bearing from the other, and also the course it is steering. The same apparatus can be used for communicating by the Morse code during fogs.

The great difficulty with sound signals, as distinguished from light signals, is that they cannot be located with accuracy. Cases are on record in which two officers standing on the bridge of the same steamer have differed as much as 90° in their estimate of the direction of a fog signal, which was distinctly heard by both of them. Nothing is more common than for a vessel to turn out of its course under the impression that a certain signal is several points on the bow, when it is really dead ahead. This is what happened when the United States auxiliary cruiser *Prairie* went ashore in a fog off Montauk point, when bringing United States soldiers home from Cuba. Ferryboats find it impossible to navigate in thick weather because they cannot be sure of the location of the various signals that are placed along the shore and cannot find their slips. If the fog signals were as easily located as the lights, navigation would be as simple in thick weather as it is at night.

Foster's system of fog signalling is designed to overcome this difficulty by making the sounds of such a character that they shall announce with certainty to any person within hearing the exact direction from which the warning sounds come. This is accomplished by the use of a sound director or megaphone, which concentrates and projects various signals, first in one direction, and then in another, combined with an apparatus for varying the signal according to the direction to which it is sent. Any passing vessel must hear one of these sounds more clearly than the others, and the signal that it hears most distinctly tells it the exact direction from which the sound comes. Experiments made by the light-house board of the United States have shown that when a vessel is opposite one of the megaphones, the sound sent out by that megaphone is overpoweringly greater than the sound from any of the others, and that at a distance of more than a mile it is impossible to hear any of the sounds except those sent by the megaphone which is pointed directly toward the listener.

The apparatus is in the form of a single automatically revolving megaphone, which turns to each of the eight points of the compass in turn—west, northwest, north, etc.—and gives a signal for each point by means of a simple code of long and short blasts. All the signals which signify the general direction of west begin with the short blast, while all those signifying the general direction of east begin with a long blast. Opposite points have opposite signals—east, for instance, being one long and one short, while west is one short and one long, so that if you learn half the code you know the other half. The full code is as follows: One long blast, the signal you hear is north of you; one short blast, it is south of you. Two long blasts, signal is north east; two short blasts, it is south west; one long and one short, it is east; one short and one long, it is west; two long and one short, it is south east; two short and one long, it is north west.

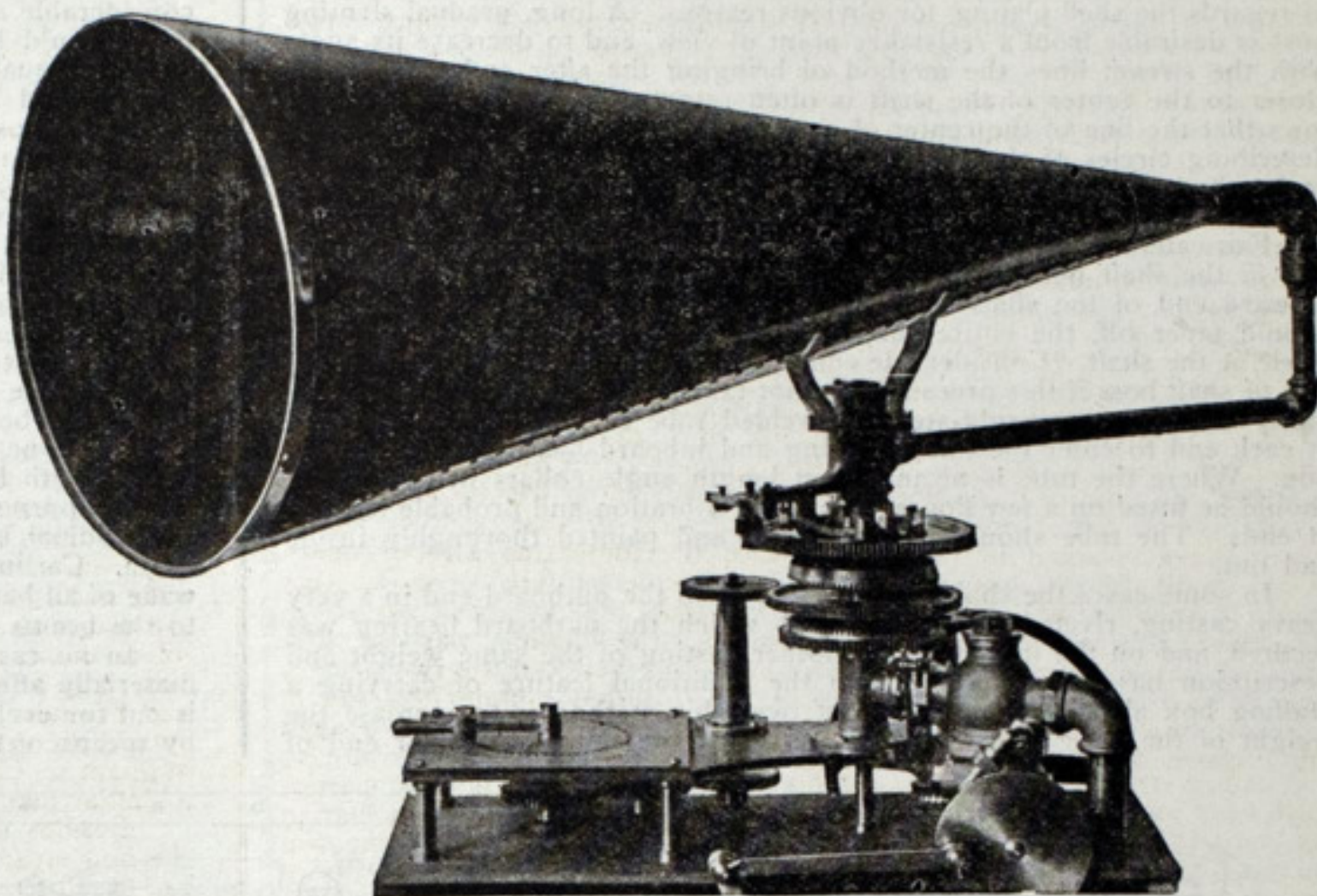
When the apparatus is placed upon moving vessels for the purpose of avoiding collisions, it is so constructed that the megaphone can be easily turned, so as to give the proper signals no matter how much or how often the vessel changes its course. To accomplish this, a pointer on a dial representing a compass is shifted so as to agree with the course steered. If the vessel's course is W. S. W., for instance, the pointer is simply put on that mark on the dial. As the vessel proceeds upon her course she blows her signals automatically, giving any other vessel which may be in the neighborhood exact information as to her position. As the revolving megaphone in its circuit points toward the bow of the vessel upon which it is placed, it blows a supplementary signal of different character, such as the whistle on the smoke stack, which shows that the megaphone is then pointing directly toward the course which the vessel is steering. If this course signal immediately precedes or follows a compass signal, it gives the vessel's course. If the megaphone signals "east," and the whistle immediately follows, showing that the megaphone is pointed over the bow, the vessel must be east of you, and its course must be a little north of west.

Suppose a steamer going due east hears a signal "north" faintly, and a few seconds later hears the signal "northeast" very distinctly. She would know that there was a vessel northeast of her; but, as that vessel did not blow her course signal, there was no danger, as she could not be approaching. A few seconds later the signal "east" is heard faintly, and is followed by the course signal. The unseen vessel must be on the port bow, going on a course northwest by west. When two signals are heard with equal clearness, both louder than any preceding or following ones, the direction of the danger must be midway between the two points which are heard with equal distinctness.

Previous inventions have considered it enough to indicate the course upon which the vessel proceeds; but this is a serious error, as will be seen from the accompanying diagram, in which the vessel A is in no danger from B, which has already crossed its path, but must come into collision with C, which is going on the same course as B. To avoid collision in such circumstances, the position as well as the course must be accurately known. In the position shown, the vessel B would indicate the absence of danger, because her course signal would be sounded long before the E. signal of position. The vessel C would give her position N. W., and immediately follow with her course signal. Reciprocal signals of danger being given by the vessel A at the same time, both A and C would be warned in time to turn aside, according to the rules laid down for vessels which meet each other showing red and green.

Men-of-war use this apparatus to enable the vessels of a squadron to maintain an exact position with relation to one another on the darkest night, without having to show a light of any kind. During blockades a vessel could indicate its position to the commodore at night, and the signals would be quite inaudible on shore, as the megaphone would not be pointed that way. In foggy weather, a fleet could proceed in regular order, each vessel in line advising the next one of its exact position.

A very simple attachment to the signalling apparatus enables vessels to communicate with one another by the Morse code, but the messages sent are inaudible to any vessel but the one toward which the megaphone



is directed, so that two men-of-war might send messages which could not be heard by the enemy.

When placed upon a light-house, this apparatus is particularly useful to small boats that may be caught in a fog without a compass, because, if the sailor knows the course he should steer from the light-house, he can get into the range of the proper signal and keep in it until he arrives at his destination. With the present system of signalling it is a common thing for a small boat without a compass to be aware that there is a fog signal blowing on the port hand, for instance, but quite impossible for the sailor to tell whether he is on the north, south, east or west side of that signal; therefore, he has not the slightest idea of which direction he ought to take in order to reach port.

This apparatus was erected at Falkner's island on Long island sound, and thoroughly tested by a special committee appointed by the United States light-house board. The report of this committee was so favorable that the United States government immediately purchased the apparatus as it stood and asked congress for an appropriation for the erection of similar fog signals at other points. The Canadian government has also purchased the apparatus, and is erecting a signalling station at Fame point in the Gulf of St. Lawrence.

The apparatus is manufactured by the Hamilton-Foster Fog Signal Co., 11 Broadway, New York, and is patented in all maritime countries.

## A VERY LARGE CHAIN WORKS.

James McKay & Co. of Twenty-ninth street and Liberty avenue, Pittsburgh, announce the completion of their new factory, to be known as works No. 1 (the old factory being known as works No. 2). The new factory is located at McKees Rocks, a suburb of Pittsburgh, about four miles from the center of the city. James McKay & Co. have in these works the largest and most complete single plant of its kind in existence. The machinery is operated by electricity and that used for the manufacture of chain, such as hammers, winders, cutters, benders, testing machines, etc., is entirely new and largely made from the company's own patterns and designs. A testing department contains two hydraulic testing machines, one with a capacity of 100,000 lbs. for light testing and the other with a capacity of close to 700,000 lbs. The 7,000-lb. machine is the largest ever made for this purpose. With the new plant in full operation McKay & Co. will have capacity of 10,000 tons of finished product annually, or in other words an increase of five times the present output. The product will range from a dog chain to the largest ship cables made, with all kinds of special chains and attachments.

"Our aim," says a letter from the company, "is not only to increase our output, but also to better our already high standard of quality, and we feel that with the aid of our new machinery we are now able to manufacture not only the highest quality, but also the most uniform class of goods."

The launch at Chicago Saturday of the *Fred B. Wells*, fourth steamer of the Peavey fleet, marked the building of the fiftieth boat by the Chicago Ship Building Co. in twelve years.

Low Rate Excursion to New York via B. & O.—Tickets on sale daily until Oct. 20 with privilege of returning via Buffalo. Call at city ticket office, 241 Superior street. Oct. 20.



## CONSTRUCTION OF TORPEDO BOATS AND DESTROYERS.

BY GEORGE H. WILSON.

Considerable space has heretofore been devoted to some of the principal parts of these boats and a great deal of detail gone into. A departure will now be made in that some of this detail will be eliminated and the various subjects will be considered in a more general manner. In the last of these articles the details of shaft struts and hangers were dealt with. Continuing along that line the shaft tubes and shaft boss will be the next items considered. The shaft boss plate must be an outside plate as regards the shell plating, for obvious reasons. A long, gradual slanting boss is desirable from a resistance point of view, and to decrease its angle with the stream lines the method of bringing the after end of the boss closer to the center of the shaft is often resorted to. It necessarily follows that the line of the center of shaft and a line through the centers of describing circles of the boss at various frames will be at an angle with each other. This method, of course, applies to boats having an inclined shaft line.

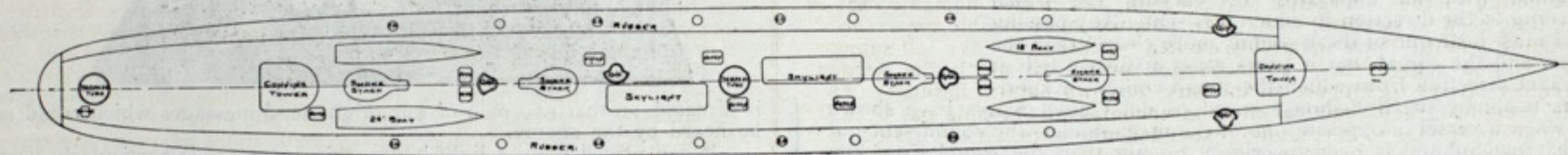
Fairwaters of light steel plates in two sections should be fitted at the end of the shaft boss and on both ends of the shaft hanger and on the forward end of the shaft strut. The fairwater at the end of shaft boss should taper off, the entire shape of same in an easy line ending in a circle at the shaft. Considerable eddying will take place behind the blunt end of shaft boss if this precaution is not taken. The shaft tubes are generally made of a wrought-steel lap-welded tube in one length, threaded at each end to enter the outer bearing and inboard bearing and stuffing-box. Where the tube is of any great length angle collars in two pieces should be fitted on a few floors, to prevent vibration and probable leaking at ends. The tube should be galvanized and painted thoroughly inside and out.

In some cases the shaft tube has ended on the outboard end in a very heavy casting, riveted to the floors, to which the outboard bearing was secured, and on the inboard end another casting of the same weight and description has been worked, with the additional feature of carrying a stuffing box also. An improvement over this method is to increase the weight of the floor plates for two frames at the outer and inner end of

with the shaft and rudder, where any brass or yellow metal comes in contact with or is near to any part of the steel structure, zinc rings or slabs should be fitted to prevent or take up the galvanic action. Iron screws should be used to fasten the zinc to the parts and the zinc should be perfectly clean and bright, and where possible it should come in contact with the two different metals.

The decks, as an important item of the hull structure, should receive considerable attention and in the matter of their arrangement still more time should be devoted to obtaining the best results. As regards the structural qualifications the usual practice of carrying a good wide stringer plate should be followed. The weight of this should run from 8 to 10 lbs. amidships to 5 to 7 lbs. at the ends. This applies to either the flat-deck type or to the turtle-deck type, as in the latter case the deck is either continued as a whole under the turtle deck or else the stringer is carried to the collision bulkhead. The deck lying between the stringers is generally worked in the jog-lap manner and varies in weight from 4 to 7 lbs. amidships and from  $3\frac{1}{2}$  to 5 lbs. at the ends. Sometimes the same weight is used throughout the length of the boat for this plating. The plating over the boiler spaces and over a portion of the machinery space should be so arranged as to be removed with the least cutting of rivets and the least possible disturbance of deck arrangements. Wherever it is possible continuous beams should be worked in the machinery spaces, the sections of same to be larger than the ordinary beam. This counteracts somewhat the strength lost by cutting in the wake of boilers and engines. Where for any purpose the beams are cut they should be well bracketed to the longitudinal bulkhead and securely strapped to the solid portion of the beam. Carlings of the same size as deck beams should be worked in the wake of all hatches, skylights, enclosures, etc., and should be well fastened to the beams by plate clips.

In no case should the deck stringer be a portable plate, as it would materially affect the strength of the boat. In all cases where the stringer is cut for deck lights, coal holes, etc., the strength should be brought up by means of doubling plates. As regards the construction of the turtle



PLAN I.

shaft tube, to carry double frames around the shaft boss on two frames at after end, and a much lighter casting can then be fitted between the frames at both ends, to form the necessary bearings, etc.

Probably no part of a boat needs closer attention or a generous outlay of thought and consideration than the shell plating forming the hull, that principal item of all vessels. Although lightly touched upon in dealing with the scantlings of the boats in question there is still room for considerable thought and discussion. As the general type of these boats is of the flat-keel order, the keel plate is generally considered part of the shell plating. In nearly all designs the keel and the sheer strake call for the same weight of plating, decreasing at the forward end more than at the after part of the boat. The weights of plating generally used for these strakes run from 9 to 12 lbs. amidships to 5 to 8 lbs. at forward end and 6 to 9 lbs. at after end. For the remainder of the shell there are different practices, one being to use the same weights and decrease throughout and another to work the heavier strakes near the keel and sheer strakes, with the lighter plates coming in the wake of the bilge. The advantage gained by this latter method is obvious, considering the extra material placed at the most advantageous points to aid in resisting bending strains. The weights of these various strakes vary from 7 to 8 lbs. amidships to 5 to 7 lbs. at the forward end and 6 to 8 lbs. at the after end of boat. The reductions of scantlings at the ends is caused by similar reduction in the strains in those vicinities. Local strains must, however, be taken into consideration and the weight of shell plating increase accordingly. In the lower strakes near the bow it is good practice to increase the weight of the plates to resist the jarring strains incident to the boat pounding in a sea-way, causing loose and leaky rivets and oftentimes causing a rivet to break away entirely. This practice will also hold good at the stern when the boat is of the flat-stern type, as the shock incident to a heavy sea striking the flat stern is very great. This latter condition is, however, generally well taken care of by the increase of the weight of shell plating aft, to take care of the vibrations and weights of the propelling gear, such as shafts, struts and propellers, and the rudder.

In the distribution of the strakes of the shell plating as regards outer and inner strakes, there is a diversity of opinion. The rule for the flat-keel plate is invariably to make it an outside strake where any number of water-tight bulkheads are to be used, as is generally the case in the types of boats with which this article has to deal. The reason for this is that it allows of the fitting of bulkhead liners, which bring up the strength cut away by the water-tight spacing of the rivets. This strength is of great importance at this point. The sheer strake, according to the latest practice, should be an inside strake. The practice of extending the water-tight spacing of rivets all the way up to the deck has been done away with and the rivets for a distance of 18 or 24 in. down from deck are spaced as in ordinary frames. This eliminates the bulkhead liner from the sheer strake and allows of it being an inside strake. The advantages of this from a construction point of view are obvious. There is a great saving in weight and it allows of the erection of the sheer strake regardless of the other strakes, which in turn enables the deck stringers and covering angles to be fitted and riveted, and this is an important item in the erection of a boat. The intermediate strakes of shell plating must come in and out to suit the two foregoing strakes and in some cases it is found necessary to carry one strake in at one edge and out at the other.

At all openings in the shell for the various discharge and supply cocks, for condenser inlets and outlets, and at all bearings in connection

deck the same suggestions will apply, except that the deck beams and plating are considerably lighter. By reason of the shape of this deck, whereby extra stiffness is gained, this is possible. As in the main deck the stringer forms the important member and the intermediate plating is considerably lighter. The beams are worked in one piece and carried down to the main deck stringer, to which they are securely fastened by brackets.

Departing from the structural conditions entering into the decks, an important item for consideration is the general arrangement of them. This demands considerable attention, as so many parts of the boat are dependent upon it and it forms such a prominent feature of any boat. The first points for consideration are the hatches and skylights leading to quarters and spaces below decks. These should be sufficient in number and of ample size to answer all requirements and should be located as near the center of the boat as the compartment or the arrangement of the compartment will allow. Before going into detail it is important to give an idea of a good arrangement and the reasons for such. In all boats of this character, in fact any boat, the decks should allow some particular part for an unobstructed gangway or passageway fore-and-aft and occasionally athwartships. The smokestacks and conning towers necessarily taking up the center line of the deck, we are forced to use, and wisely so, the rail for a clear fore-and-aft passageway. The good points of this are that it allows of a gangway along that part of the boat which will be mostly used in both peace and war. The great fault of some of the first boats constructed was the entire absence of such a feature. When such boats were in action on dark nights during the late war it was all the men could do to get from one end of the boat to the other without tripping over a hatch, a steam valve wheel, a fire plug or a coal scuttle, and when it is known that such movements must be made with the greatest hurry and generally with a load of shells to carry, the boat rolling in a heavy sea, etc., too much care can not be given to such an important feature. If a clear passageway is provided along the rail on each side of the boat about 2 ft. 6 in. or 3 ft. 6 in. wide, with nothing to stumble over or to trip one up, a great improvement has been made along this line. This, then, is the reason for keeping the hatches and skylights as far inboard as possible.

Next in importance is the disposition of the guns and torpedo tubes. The latter are generally placed on the center line of the boat, so the former are of more importance in the present discussion. The best arrangement for the guns is to locate one of the larger caliber on each conning tower and one of the smaller caliber on each side abaft the forward tower, to take care of the right ahead fire; the three guns forward to train from dead ahead to a point well aft and to have the maximum depression to take care of approaching craft. This latter can generally be taken care of by the small arms. The gun on the after tower should train from dead aft to a point well forward. All other guns going to make up the armament should be mounted on the center line of the boat or as near to it as possible and have sufficient depression to clear the rail when cast away for action.

The stowage of boats is next in order. Provision should be made for carrying them on the deck in cradles, inboard of the gangway clearance line. The location of ventilators is another point which demands attention, and as in the case of all the other deck fittings, they should be located inboard and whenever possible they should be located with a view of keeping them out of the line of gun or torpedo fire, thus enabling



them to be made permanent, a very important feature on a boat where so many deck fittings have to be portable. Another fitting that should receive attention in the matter of location is the fire plugs from the fire main below decks. These plugs are great "foot-catchers" and should be located in out-of-the-way corners, allowance being made for a proper hose connection and leads. The fore-and-aft passageway coming over the coal bunkers, as it does necessarily, locates the coal scuttles in the passageway. To obviate the possibility of these being stumbling blocks they should be made flush with covers of composition. The disposition of the various chests and lockers about the deck should be governed by the location of the fore-and-aft passageway and by the transverse passages. As regards these latter, provision should be made for two or three across the deck at the most convenient points, the same to be clear from all obstructions.

### GERMAN SHIPPING SUBSIDIES.

THEY AMOUNT TO \$2,000,000 IN CASH AND TO A MUCH GREATER SUM GIVEN INDIRECTLY IN THE SHAPE OF EXEMPTIONS.

While the following article from Engineering, London, has no direct reference to Herr Ballin's recent statement that the German government pays no subsidies, it is, on that account, a more crushing answer to that gentleman's plea. The fact remains that the German government pays a direct subsidy to shipping in the sum of about \$2,000,000 and an indirect subsidy in the shape of exemptions from customs duties and preferential railway rates to a much greater sum. Engineering says:

There is no doubt that, of late, a great many thoughtful persons have, by the inexorable logic of facts, been compelled—often much to their own surprise and annoyance—to reconsider the point of view from which they regard certain questions of political economy. At least a great many of us are not quite so cock-sure as we once were that there can be no compromise, no exception, to certain well-rounded and complete formulæ, of, as it appeared, universal application. One of our favorites was that no industry could be brought to a successful issue by state aid. That is a fine open-air policy; and we have always been unanimous in our contempt for "swaddling clothes," forgetful that the bulk of civilized humanity has at one time been so swathed, to its great comfort and probable preservation. Shipping bounties have invariably excited our derision. We self-supporting Britons regard them as ineffective props by which the helpless foreigner strives to support an industry our own natural heritage. As a rule, doubtless, their practical effect in encouraging shipping has been far from proportional to the money expended, the expectations raised, and also, perhaps, to the fears excited. Nevertheless, shipping bounties may constitute one of the questions worth reconsidering—not, of course, with a view to our own adoption of them, but to see how we may possibly be affected through our rivals abroad.

It is Germany that is making the most determined bid for a larger share in the world's shipping industry, and some interesting figures bearing on the question are given in a report recently made by Mr. W. Ward, consul-general in that country. The report is complete only so far as information is available, not all the figures bearing on the question having been made public. It would appear from this publication that the sum paid by the German government is much smaller than is, we think, generally supposed. In the year 1898 the total amount of bounties accorded by the state in Germany, in the form of subsidies, to German shipping companies for postal services was £325,000, it having risen to that sum from a total of £200,000 in 1889. These figures, however, do not include £65,000 paid annually by the German post office to the Hamburg-American and to the North German Lloyd companies respectively for the carriage of mails to America.

The amounts are certainly not overwhelming, especially when we are told officially that the German government considers "the annual sums to be granted as postal subventions in Germany cannot be regarded merely as a payment for services rendered," but that they are "for establishing and subsidizing German mail steamers between German ports and Australia, Eastern Asia and Africa." This was the declaration made in 1885 by a government memorandum submitted to the imperial parliament with the bills proposing the subsidies. The results, so far, are characteristic of the genius of the frugal German people, to get a very good return on a very small expenditure.

There is, however, a good deal more in favor of the German ship builder and the German ship owner; though, unfortunately for the prospect of any exact comparison, we are unable to reduce the additional factors to a monetary standard. The customs tariff law of 1885 provides certain exemptions and privileges which materially affect the question. For instance, it is enacted that there shall be no customs duties on sea-going vessels and river craft. That is an advance not favorable to the German ship builder, however gratifying it might be to the ship owner and trader. Owing to the enterprise of the former, however, it is becoming of less importance as time passes. Completed vessels are not alone exempt, for there is a long and comprehensive list of articles that go towards making up a ship and its equipment that are also customs free. These include materials destined for the construction, repair, and equipment of sea-going vessels, including the ordinary ship's gear from "ropes and rigging, anchors, chains and sails," down to "axes, hammers, nails, hooks and other tools."

An important concession is also made by the government in favor of home-built ships by means of preferential rates on the state railways for material that is to be used in the construction of vessels. Mr. Ward tells us that since 1895 "a preference of 1.7 pfennig, plus 12 pfennigs per ton per kilometre, was granted in lieu of the ordinary rate of 4.5 pfennigs to 3.5 pfennigs plus 12 pfennigs, on the materials in question 'in order to assist German iron industry and ship building.'" Another form of encouragement to German ship building—again at the expense of the state railways, or rather, perhaps, the freighters who use them,—is given in the shape of preferential rates accorded to the German East African line and to the German Levant line, both of Hamburg. These two companies are granted "largely reduced rates of carriage by all German state railways on goods exported from inland places of Germany or through bills-of-lading either to East Africa or to the Levant respectively."

These things are, of course, as economic heresies to the orthodox protection-hating Briton; whose "orthodoxy is my doxy and heterodoxy other people's doxy." It will be seen, also, how impossible German policy would be in this country, where we have no state railways on which to impose the natural burdens of sea carriage, but even prohibit our company-owned lines to discriminate in freight rates in favor of individuals or localities. No doubt on first principles it is unfair and inexpedient to make one person pay for another person's requirements; but in a complex state of civilization first principles may sometimes with advantage be over-ridden. The Hamburg house-builder may with reason complain at having to pay 3.5 pfennigs for the carriage of a given weight of steel joists from Düsseldorf, whilst his neighbor, the ship builder, pays but 1.7 pfennigs for plates and angles; nevertheless, it may possibly be expedient for the state to countenance the arrangement. The house must be built in Germany in any case; the ship need not be. But, it may be said, if the ship can be bought by German owners from, say, England, is it not better to let it be built abroad, and to direct German enterprise into channels where it can be employed under greater natural advantages? That, no doubt, is a good argument, so far as it goes; but here the analogy of "swaddling clothes legislation"—which we naturally resent at home—comes in. In 1885 the German steam shipping industry was an infant. By protection for a time from the keen blast of British competition—through a little cossetting, a short period of nursing which infancy can justly claim—it bids fair to grow to a vigorous youth, even if it has not already reached man's estate. Whether that time has arrived it is for the German people to determine; though from the vast dimensions to which the steel manufacturing industry of the country has grown, and from the fact that the fastest ocean liners in the world are of German build, it would seem that the "swaddling clothes" might be well thrown off (lest they prove enervating), and that German ship building might now be nourished on the strong meat of open competition.

If we turn, however, to the German shipping returns, we do not find that the fostering care of the German government has resulted in as great an increase in shipping as might, perhaps, be expected; and, indeed, as is, we believe, generally supposed to have taken place by the British people. The fact is, the building of a few imposing and magnificent vessels, such as the Kaiser Wilhelm der Grosse and the Deutschland, have strongly impressed the public imagination. But if we take in the whole figures, we find that during the last ten years of which we have statistics the increase in German-owned vessels has been not much more than 300,000 tons; for the total net registered tonnage in 1889 was 1,320,721 tons, while in 1898 it was 1,639,552 tons. These figures are, of course, not large compared to our more imposing totals. The Baltic ports have shown a considerable decrease, a fact which makes the progress of the two great North Sea ports, Hamburg and Bremen, more marked, especially in regard to steamships. Figures bearing upon the total maritime trade of Germany are not published, but those relating to the two chief ports are available, and these show very notable progress. In 1889 there were imported into Hamburg 93,032,868 cwt. of merchandise of a total value of £62,279,038. The corresponding figures in 1898 were 177,904,566 cwt., and £100,743,506. The exports from the same port in 1889 were 47,914,628 cwt., valued at £60,320,746; in 1898 they amounted to 79,251,066 cwt., the value being £74,668,068. The figures for Bremen are naturally smaller. In 1889 the imports were 27,663,644 cwt., having a value of £21,876,728; ten years later, in 1898, the imports had grown to 47,510,450 cwt., their value being £34,072,991. The exports of Bremen for 1889 were 15,500,534 cwt., of a value of £14,338,001; and in 1898 they had grown to 24,997,318 cwt., valued at £19,292,617.

In the government return to which reference has been made, Mr. Ward gives some important and instructive figures, indicating the increase that has followed upon state assistance, more especially on those routes practically affected, such as China, Japan, and Australia. We have not space to quote these here, but we would refer those more directly interested in the subject to the original report for details, and will content ourselves with quoting Mr. Ward's final words. "The figures and observations," he says, "which I have submitted will sufficiently prove that the direct and indirect bounties granted by the state to the several German steamer lines above referred to have been of very valuable use towards developing German trade with the Levant, East Africa, Australia and the Far East."

Whether state bounties, either in the form of direct money payment, or of other concessions, are going to help or hinder German commerce at large, and the shipping industry in particular, is a matter that time will give us matter upon which to form an estimate; but whatever the result may be, the matter is beyond our control. The ultimate and practical issue of the whole question is, however, chiefly within our own grasp. It the inland German manufacturer gets from the state-owned railways a largely preferential freight tariff to the shipping port for goods he sells for abroad; whilst on our own railways obstacles are put in the way of British products being carried to the coast; it is evident the German will hold a commanding position that must turn the fortune of trade war, other things being approximately equal. Again, if British ship owners combine and agree to carry foreign-made goods—German or Belgian—to distant lands at a less cost than they will transport British goods from British ports to the same places, it is also evident that we put into the hands of our competitors another powerful weapon by which our home industries can be attacked. Under conditions such as these it is but a question of time before the export trade of British-made goods dwindles to small proportions, unless our manufacturers can, by ingenuity and skill, provide large compensations in other directions; a thing ever growing more difficult to accomplish in these times of universal knowledge and rapid transit. What will become of railway companies and steamship lines if the export trade of the country is seriously crippled is a matter that possibly the managers of those enterprises have not been at pains to consider, thinking that British trade has sufficient flywheel to last their time, and a present gain is preferable to prospective profit. Those who guide the destinies of the nation, however, may be expected to survey a wider horizon; it is their duty to consider what steps should be taken to preserve to our children the heritage left by our fathers. The solution of the question is doubtless beset with difficulties, but there are few problems more worthy of attention. Something has already been done by the select committee on steamship subsidies, which it is to be hoped will be re-appointed, so that its labors may not be altogether lost. It is not, however, from foreign subsidies that we need fear most; the great enemy is within our gates.



## NATIONAL RIVERS AND HARBORS CONGRESS AT BALTIMORE.

The National Rivers and Harbors Congress began its session in Baltimore on Tuesday of this week and adjourned Wednesday without deciding upon a place of meeting for the next congress. Mr. Robert Ramsey, chairman of the rivers and harbors committee of the Baltimore board of trade, called the assembly to order on Tuesday and introduced Mr. M. J. Sanders of New Orleans, to whom, he said, was due, more than to any other man, the idea of holding such a congress. The permanent organization of the congress resulted in the election of Mr. George E. Bartol of Philadelphia as chairman; Col. W. H. Love of Baltimore as secretary, and Messrs. E. R. Sharwood of Philadelphia, George H. Lord of New Orleans, and F. A. Scott of Cleveland, as assistant secretaries. It was decided by the adoption of the report of the committee on organization that the constituency of the convention should be defined in the call as follows: Delegations from trade, manufacturing, transportation, agricultural and labor organizations and accredited delegates from states and cities. Furthermore, that the only subjects considered by the congress should be those dealing directly with waterways for the carriage of commerce and the promotion of a general public interest in the increase of means and facilities for water-borne commerce.

Of course the principal act of the congress was the adoption, before adjournment Wednesday, of resolutions embodying its sentiments with regard to congressional appropriations for the improvement of waterways. Congress was also urged to take speedy action in the matter of constructing the isthmian canal. The resolutions are as follows:

"Resolved, that this congress asserts that the best development of our national resources demands the adequate improvement of our waterways; and therefore it indorses and urges upon the congress of the United States a liberal policy in their improvements, through systematic and adequate appropriations therefor. This congress deplures and condemns any action which leads to the failure of rivers and harbors legislation.

"Resolved, that it is the sense of this congress that the improvements of rivers and harbors is fully as important as the work carried on by any department of the general government, and for this reason we urge that appropriations therefore be placed upon such a footing as will insure at all times ample funds for a vigorous prosecution of the work; and to this end we indorse the system of continuing contracts.

"Resolved, that in the judgment of this congress all items should be excluded from the rivers and harbors bill that do not appertain to the improvement of harbors and waterways for the purpose of water-borne commerce.

"Resolved, that the wonderful prosperity of our country is largely due to the vast increase in our foreign commerce, and that to advance our position as a great commercial nation all possible facilities must be afforded, deeper and wider channels must be created to meet the requirements of modern steamships that have revolutionized the commerce of the world.

"Resolved, that our great systems of international navigation by the lakes and waterways of our country, besides being so essential as great highways of commerce, to the fullest development of national resources, are effective regulators of freight rates, and we therefore urge their continuous and systematic improvement, with liberal appropriations therefor.

"Resolved, that an executive committee of seven be appointed by the president of this congress, representing the different sections of the country, who shall have general charge of the affairs of this congress, with power to convene future meetings, and to perform such other duties as may be necessary to carry into effect the purposes and objects of its organization.

"Resolved, that the foregoing resolutions be formally submitted to the appropriate committees of congress at its next session by a committee, consisting of one delegate from each state, to be appointed by the president of this congress, who shall be ex-officio a member of the committee."

### ADDRESS OF CONGRESSMAN BURTON.

A feature of the congress was the address of Representative Theodore E. Burton, chairman of the house committee on rivers and harbors, who is beyond question the most thoroughly informed man on waterways of the United States. Mr. Burton said in part:

"The influence of this assembly should be exerted for liberal appropriations for rivers and harbors, but liberality should always be coupled with discrimination. Appropriations should not be denied because large amounts are required to secure the best and promptest results, but there should be equal care to prevent waste or the adoption of unworthy or impracticable projects. In view of the necessary limitations in the amounts appropriated in river and harbor acts, and the pressing need for deeper channels and improved facilities along established lines of traffic, it is better to appropriate for localities where traffic is already established than where its development is uncertain or problematical. It is more business-like to finish one and obtain results from it than to make piecemeal appropriations upon all. In Great Britain the central government does not improve channels or harbors, except for the purpose of national defense, but municipalities and private corporations have expended for these purposes greater amounts than in any other country. Not many years ago the Tyne at and below Newcastle was improved at an expense of over \$20,000,000; the Mersey and Clyde at still greater expense; the Manchester canal, 35½ miles in length, was built at a cost of \$75,000,000 or more, and \$150,000,000 has been expended for canals in the interior of the country. Theoretically the charges imposed are commensurate with the cost of the improvement, but in practice it is rarely so.

"A system under which the central government improves harbors and channels and imposes charges in the form of tolls, extra duties, port or wharfage dues, the income of which is in greater or less proportion to the expense, is well illustrated by the action of the republic of Uruguay, which last December contracted for the improvement of the harbor of Montevideo at the expense of \$9,916,336, and made provisions for payment by the imposition for an extra duty of 3 per cent. on dutiable imports and 1 per cent. on dutiable exports. The port of Antwerp has

been improved at an expense of \$30,000,000. Approximately three-fifths of the expense has been paid by the Belgian government and two-fifths by the city of Antwerp.

"A third system is that under which the general government improves channels and harbors, and imposes no charge upon commerce with a view to obtaining compensation for the improvements. This method is in vogue in the United States, both as regards rivers and harbors. In France, it is followed in the navigation of rivers and canals, all tolls upon which were abolished in 1880. The policy pursued in the United States has not been altogether consistent or uniform. The very first act on the subject recognized a policy similar to that described in the first system described above, namely, the making of improvements and imposition of charges by a private corporation or municipal body. It was passed on Aug. 11, 1790, and gave consent to the operation of acts passed respectively by the states of Rhode Island, Maryland and Georgia, authorizing and levying of a duty on the tonnage of ships by the River Machine Co. in the town of Providence, by the wardens of the port of Baltimore and the collection of such a duty for the purpose of improving the River Savannah. Similar statutes were passed at a later date consenting to the operation of acts passed by the states of Massachusetts, Pennsylvania and Virginia. It may be regarded that under the general welfare clause of the constitution and the authority vested in congress to regulate commerce between the states, the right to take control of and to make appropriations for river and harbor improvements is well settled, though these appropriations have been made irregularly, and at times only for a limited number of objects."

### AGGREGATE OF APPROPRIATIONS FOR RIVERS AND HARBORS.

Mr. Burton then gave an exhaustive history of the legislation affecting harbors and river appropriations up to the present time. He showed that the amount appropriated by the general government for the improvement of rivers and harbors down to and including 1886 was \$184,513,339.52; to and including 1892, \$236,232,432.06, and the total amount appropriated to date \$414,765,772.30.

Mr. Burton continued: "It will be profitable to notice several familiar objections to expenditures for rivers and harbors. There is a prevalent misapprehension that a very large share of these appropriations is for insignificant streams. There is a constant succession of newspaper editorials and paragraphs in regard to amounts expended upon shallow creeks and ponds. An examination of the facts will prove these statements to be utterly without foundation. The average amount applied for minor streams in recent biennial river and harbor bills has been from \$500,000 to \$1,000,000. The policy of making these appropriations may be questioned, but it would be difficult to find arguments which would not apply to all river and harbor improvements. While it is unnecessary to state that not every stretch of navigable water should be improved by the federal government, some of these appropriations are of the most beneficial nature. Numerous streams enter into the sea or larger rivers, to which considerable areas of territory having no railway facilities are tributary. For many years the freight and passenger traffic has been conducted upon these streams. The creeks and streams near to Philadelphia emptying into the Delaware are of this class, also those emptying into the Chesapeake bay. In a report filed last winter, it was pointed out that the traffic on some of these streams, though small appropriations are given to them, exceed the traffic of one of the largest rivers of the country. In some cases these streams are utilized for the bringing of garden produce and fruit to the larger cities; in others for the delivery of coal, lumber and heavy material at cities of considerable size. The total amount included in the river and harbor bill of last winter for the streams of New England, excluding rivers of the first class, such as the Penobscot, Kennebec, Merrimac, Connecticut and others, like the Mystic and Providence, which are merely inlets from the sea and used for harbor and anchorage, was \$120,500, yet the total amount of freight carried upon these streams was not less than 2,000,000 tons.

"Another misapprehension which has gained considerable credence is that an undue share of the appropriations of the government are devoted to river and harbor improvements. This, upon investigation, will prove to be absolutely without foundation. The amount appropriated for rivers and harbors in the four years from 1897 to 1901, including continuing contract appropriations, was \$63,069,717.25. During these four years the amount appropriated for the navy was \$247,441,460.93, showing that the amount appropriated for one arm of the military service was about four times as great as that appropriated for rivers and harbors, and that, too, in a country affording greater opportunities for internal and external commerce than any other in the world. In comparing expenses with those of other countries, we suffer by comparison. Not only has France expended \$800,000,000, twice as much as we, though her territory is less in area than that of several single states in this union, but of late amounts entirely beyond expenses incurred in this country have been made or provided for divers harbors.

"Of late years strong pressure has been brought to bear to include in the river and harbor bill appropriations for reservoirs to be constructed for the purpose of irrigating lands. It is certainly incongruous to include in a bill which has to do with navigation provisions for reservoirs 7,000 feet above the level of the sea in localities hundreds of miles from navigable water and where the natives have never seen any style of boat except a birch-bark canoe. The problem of the reclamation of arid lands is an important one; but whatever is determined by congress should be by a bill which has to do with irrigation alone. Another form of questionable appropriations often included in river and harbor bills is the provision for protection or rectification of the banks of alluvial streams. Very large sums have been included for this purpose, and mostly in localities in which there is little navigation. Should the general government undertake the task of protecting the banks of rivers where the channels shift or wash away the adjacent land the expenditure would in time come to equal the amounts now expended for navigation.

### SUGGESTIONS REGARDING FUTURE RIVER AND HARBOR BILLS.

"There should be a more careful comparison of reports made by the government engineers, with a view to securing uniformity in their recommendations. Under the present system each of the different engineer officers reports upon the advisability of an improvement which he is called



upon by congress to investigate. If he has the rank of colonel or lieutenant-colonel his reports go immediately to the chief of engineers and are by him transmitted to congress; if his rank is below lieutenant-colonel they go to the division engineer, who approves, rejects, or modifies them. As a result reports are made according to the different degrees of conservatism or liberality of the different officers. There should also be a more uniform rule in drawing the line between work which should be done by the government and that which should be done by private parties or municipalities. The combination of appropriations for numerous small projects should be considered. An examination of river and harbor legislation will show an unusual number of projects in each bill. In that which failed last winter 401 improvements were provided for. Each of these would require a separate contract, and some of them, as in those in which there is provision for locks and dams, would require more than one. Would it not be well to group together in one appropriation and one contract a number of small projects where there are appropriations of, say from \$1,000 to \$20,000, or even much more, so that expense of the location of the plant may be shared by all of them? I can select no better illustration than that afforded by four harbors in this state on the easterly side of the Chesapeake bay, namely, Cambridge, Rock Hall, Claiborne and Queenstown. Suppose for each of these a sum approximating \$5,000 is appropriated. For each a plant is separately located and much of the amount available is exhausted for this purpose. The objection to this, of course, is the local pride of each community and the settled custom of separate appropriations which has prevailed for many years. But a greater amount of work could be secured by consolidating such projects, fixing the proportion that each should receive or leaving that to the discretion of the engineering department.

"Another question is worthy of discussion. Could a system be devised under which a part of the expense of river and harbor improvements, or of some classes of improvements, shall be borne by the adjacent municipalities, similar to those in force in cities in making special improvements in which part is assessed upon the general fund and part upon the neighboring property? A perplexing question arises upon the proper course to be pursued in improving river channels which compete with railway systems. On the one side we have the admitted fact that points which have river navigation are granted lower railway rates. To an extent the regulation and decreasing of railway freight rates is a valid argument for the improvement of channels, but this question should be determined on broad lines and in accordance with well-settled principles pertaining to transportation.

"In conclusion, let me say that nothing has contributed more to make the last century the greatest of all the centuries than improvements in transportation. The late Mr. Mulhall, in a book published in 1896, states that transportation energy in the preceding fifty years increased four times as much as production proper. The same statistician makes the interesting comparison that it now costs less to carry a bushel of wheat from St. Paul to Liverpool, a distance of 4,831 miles, than it cost in the days of

Miltiades to carry the same bushel from Athens to Marathon, a distance of only 20 miles."

#### OTHER ADDRESSES.

Addresses were also delivered by George H. Anderson of Pittsburg, L. Y. Schermerhorn of the Philadelphia board of trade, ex-Senator Gorman, J. A. Ockerson of the St. Louis merchants' exchange, M. J. Sanders of New Orleans, Walter Gresham of Galveston, W. H. Lincoln of Boston and Albert Bettinger of Cincinnati. Extracts from these will very probably be published in the next issue of the Review.

#### ITEMS OF GENERAL INTEREST.

The furnace which the Cleveland-Cliffs Iron Co. is now building at Presque Isle will probably be the largest charcoal furnace in the world. The plant will cover about eight acres of ground when it is finished. The furnace stack and the shelves for the "stoves" are being built by the W. B. Pollock Boiler & Furnace Works, Youngstown, O. The American Bridge Co. is building the structures to house the machinery and boilers. The Roberts Engineering Co. will equip the furnace with one of its patent furnace tops. The plant will be equipped with twelve Stirling water-tube boilers. Induced draft apparatus will be supplied by the B. F. Sturtevant Co., Boston. It is expected that the furnace will be in operation by next summer.

Orders will be issued in a short time by which Capt. Chapman C. Todd, chief hydrographer of the navy, will be detached from that duty and assigned to the command of the cruiser Brooklyn, the flag-ship of Rear Admiral Remy, succeeding Capt. Francis W. Dickens. Orders have already been issued designating Commander Jefferson Moser to succeed Capt. Todd as head of the naval hydrographic office. Commander Moser has been in command of the fish commission ship Albatross and will be succeeded by Lieut. Com'dr Chauncey Thomas, who is now on duty in the hydrographic office, navy department. The administration of the affairs of the hydrographic office during Capt. Todd's term of office has been most efficient.

All records for production of steel were broken in the Edgar Thomson Steel Works and in the structural department of the Homestead works of the Carnegie Steel Co. in September. Even with this enormous tonnage the mills are behind in their orders and the structural department is behind three months. Contracts are taken with the understanding that they cannot be rolled before the first of the year. The total tonnage of ingots in the converting mills of the Thomson works was 74,000. The blooming mill furnished 65,315 tons of blooms and the rail mill 59,810 tons of rails. All previous records were shattered in September in the production of structural shapes, beams, channels, angles and tees at Homestead. The best previous record was broken by a total of 3,500 tons.

### "BENEDICT-NICKEL" CONDENSER TUBES

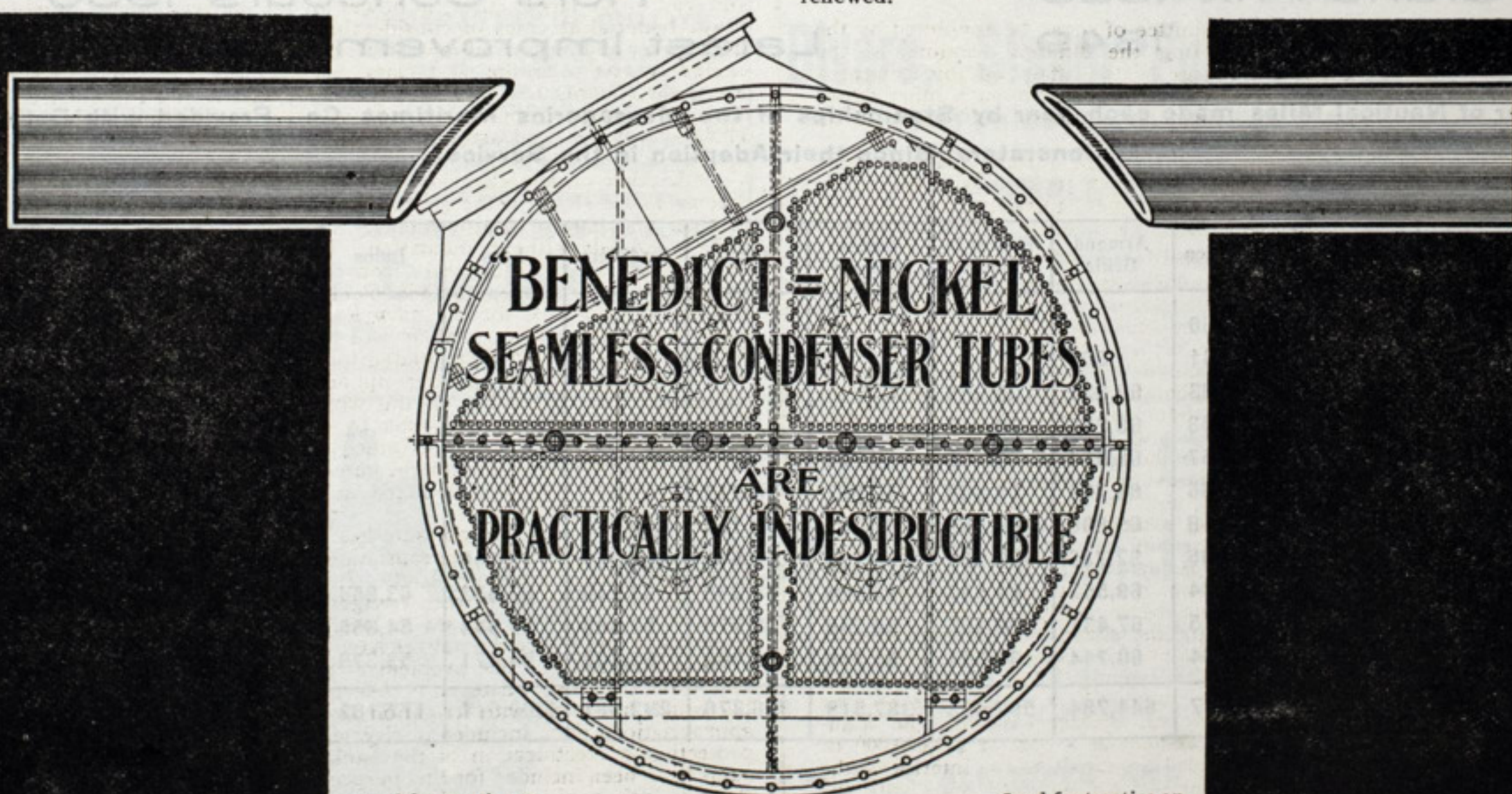
contain all the elements for resisting Electrolysis that brass or copper in themselves lack.

They contain no zinc nor any other weakening metal.

The process of manufacture gives them a spiral formation which renders them perfectly homogenous and practically indestructible.

Being stronger than brass or copper, tubing of thinner gauge may be used.

It has repeatedly been proven that the life of "Benedict-Nickel" is almost indefinite, whereas brass and copper have frequently to be renewed.



Send for treatise on "Electrolysis of Condenser Tubes."

Send for treatise on "Electrolysis of Condenser Tubes."

We are also among the largest manufacturers of seamless brass and copper tubing, and the ONLY manufacturers in the United States of this tubing hot-rolled from solid cylindrical billets—the process used in the manufacture of "Benedict-Nickel."

**Tobin Bronze** has a wide reputation for tensile and torsional strength, toughness and uniformity of texture. It was used in sheathing the "Vigilant" (1893), "Columbia" (1899), "Independence" (1901) and "Constitution" (1901). We sell Tobin Bronze at manufacturers' prices.

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**IMPROVEMENTS AT THE NAVAL ACADEMY.**

The Hoffman Engineering Construction Co. of Philadelphia, which has the contract for laying the foundation of the naval academy building for cadets' quarters at Annapolis, is fast completing the work. The ground enclosed for this building covered an area of twelve acres. The excavations for this building meant the moving of 60,000 cubic yards of earth. After the excavating was sufficiently ahead to permit it, pile-driving began. To date 5,000 piles have been driven. When this is completed it is claimed that the foundation will be the most solid thing of its kind in the world. The foundation walls and piers were begun after the piles were driven. They are of concrete. The material used for this work consists of the following: For every 100 cubic yards there were mixed 100 barrels of cement, three carloads of sand and five carloads of crushed stone. The concrete thus formed was placed layer after layer in forms made for that purpose, and when hardened makes a formation that would support the greatest weight possible. The foundation walls, if run in a continuous line with the piers placed side by side on the end, would make a length of about a mile. The walls have an average height of about 12 ft., with a width of 2 ft. 8 in. On the whole about 13,000 cubic yards of concrete will be used. This concrete is the only foundation work amounting to anything that is yet unfinished, except about 6,500 cubic yards of grading and back filling, which will be the last thing done. There are now over 600 men at work on this contract, with four pile-drivers, six upright engines with an aggregate of 170 H.P., two horizontal boilers of 75 H.P., two Worthington duplex pumps, one engine on concrete mixer, one large concrete mixer and a complete blacksmith and machine shop to make all necessary repairs.

The main building for cadets will be 620 ft. long, with the boathouse on the east and the armory on the west connected by colonnades 100 ft. long. This will make of the whole one architectural unit with a length of 1,278 ft. This is said to be the longest building in the United States. It is slightly over one-third longer than the capitol at Washington, twice as long as the congressional library, longer than any city square in Baltimore and much longer than the Boston public library, the Metropolitan museum of New York and other large buildings of the country. It has a width of 456.5 ft. The building material will be granite for the first floor; for the other four stories, buff brick, finished with granite. It will be divided into various pavilions, the principal one being the stairway pavilion, which leads to a memorial hall. This hall will be the principal architectural feature. Occupying the central portion, it will extend upward from the second floor. The walls and ceilings of this room will be magnificent, and it will have a pair of bronze doors, to cost \$10,000, the gift of Col. Thompson of New York, who has been the donor of many costly presents to the cadets. In this hall, among other things, will be kept all the sporting trophies won by the cadets. A bedroom will be provided for each of 500 cadets, with a 16 x 16-ft. study for each two. These bedrooms and studies will be in the two wings of the cadet quarters proper. The building will be thoroughly ventilated, steam heated and

fireproof and will have electric lights. The kitchen, bakery, laundry and plunge baths will be in the basement.

Work is also being rushed on the armory and boathouse buildings, especially on the latter, which as it now stands is ready for the roof. Every contractor for the Naval Academy work so far has had to ask for an extension of time, but if this building is completed as fast as the work has been done up to the present time it will surely be the first to be finished within the time specified. The armory should soon be finished. All the stonework is completed except a little stone-carving on the south end. The skylights are very nearly all in, and the cement floor is about laid. Over this cement will be placed a floor of wooden blocks. Messrs. Snare & Triest, contractors for the foundation of the new building for the department of marine engineering and naval construction, are much behind time. Their contract stipulates that 1,500 piles should be driven by Oct. 1, but to date only about 500 have been placed. This is mainly due to their inability to get piles as they were needed. Ground was broken last week for the new marine barracks on the government farm.

**EASTERN STEEL CORPORATION.**

The prospectus of the Eastern Steel Corporation, which is to take over the property of the Pottsville Iron & Steel Co., is out. The new company will be organized with \$2,500,000 capital and \$1,250,000 6 per cent. gold bonds. The owners put the property in subject only to a \$59,000 4 per cent. mortgage, which can be paid off at the present time, as a portion of it is held in trust. The owners take for the property \$541,000 in bonds, with a bonus of \$541,000 in stock. Bonds to the amount of \$400,000 are now offered at par for present improvements, carrying therewith \$400,000 in stock. This leaves \$1,559,000 stock and \$309,000 bonds in the treasury as the absolute property of the company to be used to pay the above mortgage when due, for working capital and for improvements and enlargements, in addition to the improvements at present contemplated. The works are expected to have a capacity of 100,000 tons of finished material yearly. The proposed improvements aggregate an expenditure of \$215,000, of which \$110,000 will be given to the construction of five 40-ton open hearth furnaces.

A number of very complete outfits of driving machinery and boat equipment, accompanied by plans and specifications for building the hull and installing the machinery, have been sent out by the Marine Iron Works, station A, Chicago. Several similar contracts now under way. This is a plan that they have demonstrated to be an exceptionally good one, particularly for those located at a distance where they may have suitable material and good men to do the work, provided they secured the necessary information with plans and details, all of which the Marine Iron Works furnish with their complete machinery outfits when so contracted for.

—ENGINES WANTED—We want to buy two tug engines about 14x14 or 14x16. Address Hardy & Dischinger, Toledo, O. Oct. 10

# BELLEVILLE GENERATORS

Grand Prix 1889  
Originated 1849

Hors Concours 1900  
Latest Improvements 1896

Number of Nautical Miles made each year by Steamships of the Messageries Maritimes Co., Provided with Belleville Generators—Since their Adoption in the Service.

Year.	Australien	Polynésien	Armand Béhic	Ville de la Ciotat	Ernest Simons	Chili	Cordillère	Laos	Indus	Tonkin	Annam	Atlantique
1890.....	67,728	2,460										
1891.....	68,247	68,331	204									
1892.....	68,247	68,403	69,822	23,259								
1893.....	68,379	68,343	68,286	68,247								
1894.....	68,439	68,367	68,574	68,439	37,701							
1895.....	68,673	68,766	68,739	68,808	40,887	28,713						
1896.....	69,534	92,718	69,696	69,549	62,205	63,153	40,716					
1897.....	68,250	69,606	92,736	69,555	62,235	76,110	63,357	43,146				
1898.....	70,938	69,534	69,552	69,597	62,526	63,240	63,240	62,553	63,954	22,707		
1899.....	69,534	69,615	67,431	90,405	60,246	62,778	62,868	52,344	54,855	44,007	22,884	
1900.....	69,534	67,494	69,744	69,564	61,719	62,382	62,502	51,471	53,373	62,016	63,066	52,140
Total.....	757,503	713,637	644,784	597,423	387,519	356,376	292,683	209,514	172,182	128,730	85,950	52,140

ATELIERS ET CHANTIERS DE L'ERMITAGE, À ST. DENIS (SEINE), FRANCE.

WORKS AND YARDS OF L'ERMITAGE AT ST. DENIS (SEINE), FRANCE.

TELEGRAPHIC ADDRESS: BELLEVILLE, SAINT-DENIS-SUR-SEINE.



## TRADE NOTES.

The Steam Boiler Equipment Co. of New York has just received another order from the Great Lakes Towing Co. for the equipment of a tug with its apparatus; also an order from the Standard Oil Co. for equipment of one of its ocean tugs.

The Rusden Machine Co., Warren, R. I., manufacturers of steam steering gear, have just installed on steam yacht Electra an outfit of their apparatus. The order was given in preference to other makes. The Electra is owned by Eldredge T. Gerry of New York, formerly commodore of the New York Yacht Club.

Fred H. Pell of No. 11 Broadway, New York city, who handles a large number of tried specialties in the line of auxiliary machinery for ships, is finding an extensive sale for Thorn's patent ash ejector, which has been on the market only a short time. He has just issued a circular descriptive of the device. It is guaranteed.

The Falls Hollow Staybolt Co. of Cuyahoga Falls, O., announce that owing to their improved method they are enabled to roll hollow bars of any size inside diameter, 8 to 10 ft. long. They are also producing, for those who prefer it, a superior article of solid refined charcoal iron bolt specially suited to railway and marine trade.

Nearly two years ago the Buffalo Forge Co., Buffalo, N. Y., shipped a mechanical induced draft plant to Japan for the Osaka water works in that country. A letter recently received commends the plant very highly and also tells of a reduction of 15 per cent. in coal bills. With some improvements planned in the matter of firing, the engineers predict that there will be a still further saving in the amount of fuel burned. The plant has everywhere in the Far East excited a great deal of interest.

A pattern makers lathe of the kind manufactured by the Atlantic Works, Incorporated, of Philadelphia, has been added to the equipment of the New York Ship Building Co., Camden, N. J. The Wm. R. Trigg Co. of Richmond, Va., has ordered from the Philadelphia works a band saw machine, a 24-in. pattern makers lathe with 16-ft. shears, a 24-in. pattern makers lathe with 10-ft. shears, two 12-in. pattern makers lathe with 6-ft. shears, a double revolving circular saw machine, an iron-frame rip-saw bench, a 16-in. improved joiner and a large column-face lathe.

The Newhall Chain Forge & Iron Co., Havemeyer building, New York, issues a neat form of certificate giving particulars of tests to which their product in chains is subjected. They use a testing machine of 600,000 lbs. capacity, which is licensed by the British Lloyds and approved by the United States government. The certificate of test shows weight, length, size, etc., of chain, with breaking strain, elongation and tensile strain. Every link of the Mushet steel loading and skidding chains made by this company is subjected to test. Ten ft. in every 400 ft. is cut from a chain (at random) and submitted to a breaking strain to insure uniformity of strength. Chain makers are paid by the day for this grade of chain (not on the tonnage basis), in order to secure perfect workmanship, and one man makes a chain from end to end; that is to say, it is not pieced out to different fires and then joined together. This is done to insure uniformity of heating and welding, which are all important in the make up of a perfect chain. This company's reputation for high-grade dredge and steam-shovel chain is well established along the great lakes and through the mining districts of Michigan, Minnesota and Wisconsin.

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to Ship Superintendents, Marine  
Engineers, and Students of ship  
construction.

Introduction deals with steel from  
its crude state in ore to finished  
product in ship material. Then fol-  
lows chapters dealing with principal  
structural features and alternative  
modes in which a vessel may be built.  
Largest section of the book treats in  
detail of the construction and combi-  
nation generally of the various parts  
which go to make up the whole ship  
structure—framing, plating, stern  
frames and rudders, riveting, pump-  
ing and ventilation, and includes also  
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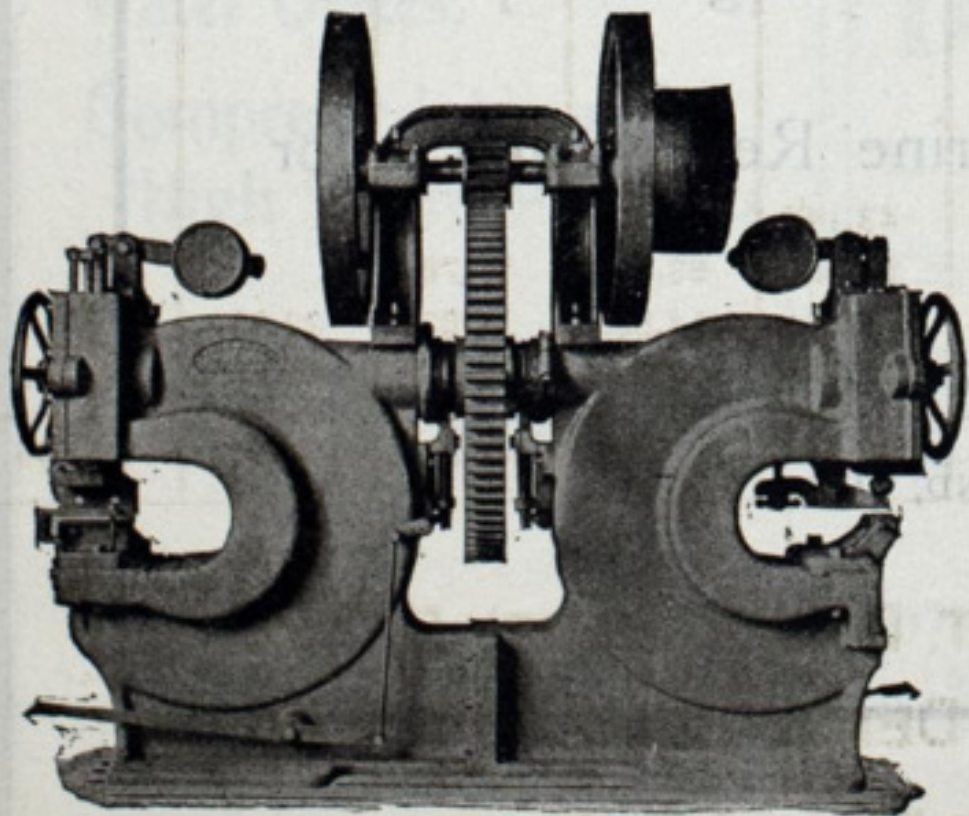
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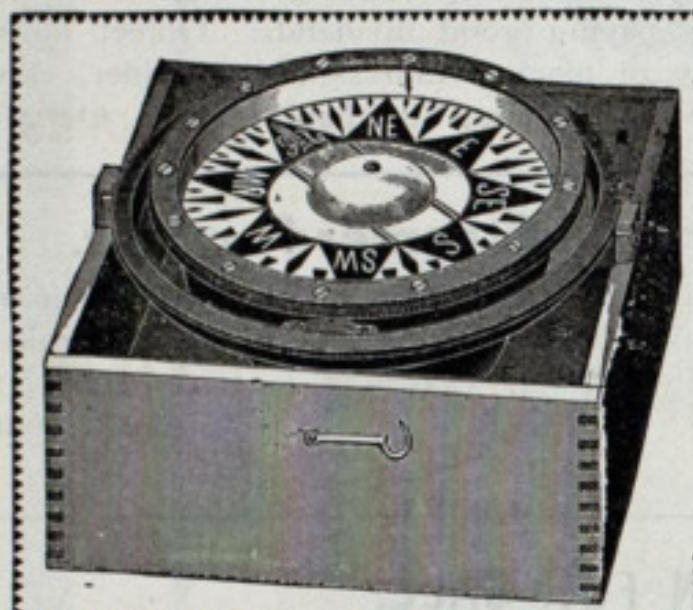
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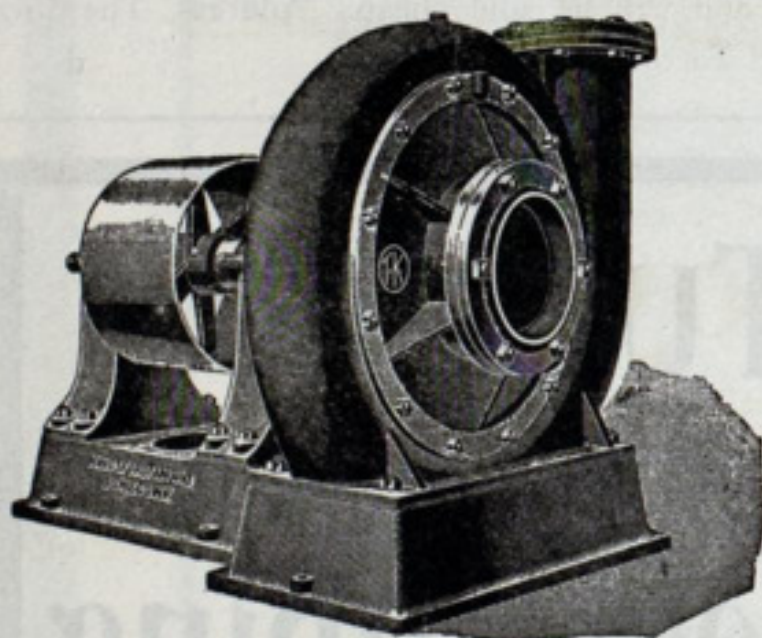


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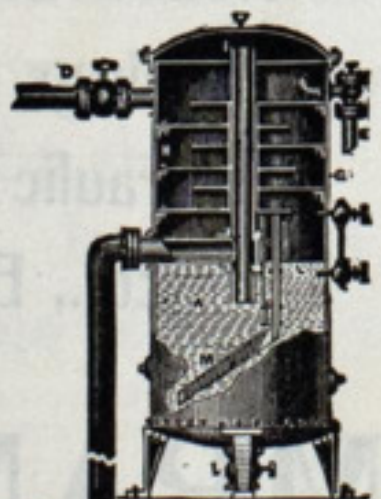
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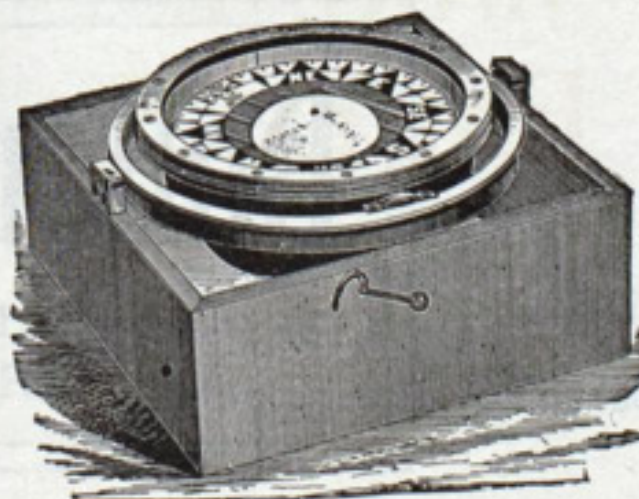
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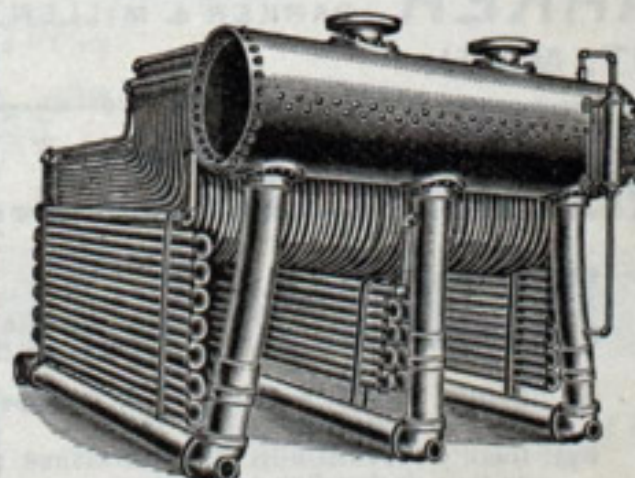
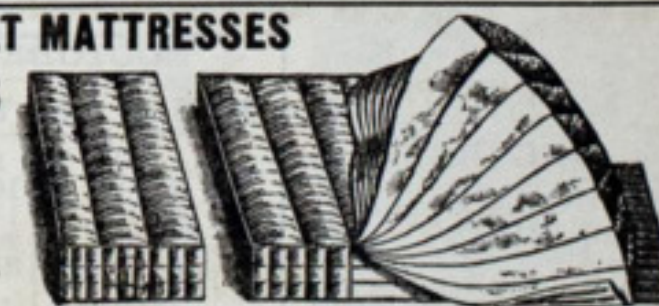
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The American Newspaper Directory stands, as it has always stood, the first and best of newspaper directories—the only one which cannot be ignored, the only one which every advertiser must have. No other can take its place; no other is needed—Joseph Auld, in the Burlington (Vt.) News of July 3, 1896.

### ADVISOR.

The Advisor accepts the American Newspaper Directory as the standard in newspaper ratings. The obstacles which obstruct its efforts to get true and reliable information are many.

The directory question is one which interests every publisher in the country—nay, the entire world. But in the United States directories are becoming altogether too numerous. In this, as with other books of reference, it is necessary to have one which may be relied on as being an authority on the matter of newspaper circulations. There can be no question about the fact that at this time, as for many years past, the American Newspaper Directory is that authority. The Advisor is not paid to make this announcement. It makes the statement in the interests of advertisers and publishers because it is true. One thing the advertiser is almost cock-sure of when he refers to the American Newspaper Directory is that the circulation figures he sees therein are not overstated to any great extent. In most other directories they are. Only the publisher himself is to be blamed for not securing a proper rating in that publication, and every advertiser of consequence knows it. Thus the publisher who refuses to furnish a statement places himself under a reasonable suspicion.—The Advisor for June.

New York, June, 1901.

### CHICAGO.

Messrs. Geo. P. Rowell &amp; Co.'s American Newspaper Directory has long since earned the reputation of being the best of its character. It contains the results of patient, expensive and systematic effort to secure all attainable information of interest concerning American newspapers. The work has been honestly done. This will not be questioned by any unprejudiced examiner. The most important question is circulation. In attempting to give this information the editor of the Directory encounters his most difficult work. It is the aim and necessity of the Directory to give the truth. The American Newspaper Directory is to-day the dependence and guide, in a greater or less degree, of every large advertiser in the country.—Chicago (Ill.) Daily News.

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Among publishers who are not willing that their real circulations be known it is the best hated book in print. The moral is not far to find.

Charles Austin Bates.

New York, June 24, 1901.

### PABST.

If the improvement of the American Newspaper Directory continues in the future as it has during the past twenty years I do not think I shall live long enough to see any other directory take its place. There will, however, be the usual crop of directories, just as every other good thing is imitated. Your long years of experience in dealing with evasive circulation reports have most admirably fitted you for placing a proper valuation upon such statements. Advertisers have come to know that the Rowell estimates are nearer the proper figure than can otherwise be obtained. The American Newspaper Directory is therefore indispensable in every well regulated advertising department. Lines are being more tightly drawn every day; it is difficult to collect for twenty thousand when you print only eight. If the advertiser were buying barley he would not accept three pecks for a bushel, although the quality might at all times be open for discussion.

The American Newspaper Directory is the guide and companion of the advertising man, and it is to the interests of all concerned to help perfect it, support it and hurrah for it.

Pabst Brewing Co.,

J. R. Kathrens, Adv. Mgr.

Milwaukee, Wis., June 7, 1901.

### SAPOLIO.

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Artemas Ward,

Advertising Manager for Sapolio.  
—In Fame, March, 1901.

### WASHINGTON.

Every page of the American Newspaper Directory breathes the desire of its publishers that it shall be absolutely correct in every statement it makes.

Truly yours, Frank Roe Batcheld,  
Clerk of the Committee on Banking and Currency, House of Representatives, U. S. Washington, D. C., Jan. 17, 1899.

### SOUTHERN.

We subscribe to and pay cash for the American Newspaper Directory, and find it of great value in our advertising department. We have 6,892 miles of railway, extending from Washington, D. C., all over the South, and in advertising this system we use more than 1,000 publications, and in selecting this list we find that we get a correct idea of circulation from this Directory that can not be obtained from any other similar publication. We receive other newspaper directories gratis; but the fact that we pay cash for this one in addition shows that we can not place the same dependence upon the "free list."

We thoroughly appreciate the careful manner in which this Directory is compiled.

Washington, D. C., Sept. 13, 1900.

Jos. H. Hannen,

Adv. Dept. Southern Railway.

I am looking forward to receiving the new edition with a great deal of anticipation as, although the American Newspaper Directory seemed to have reached a high state of perfection several years ago, there is always something new and of value in each succeeding edition. It is regarded as the standard authority with the Southern Railway.

S. H. Hardwick,

General Passenger Agent.

Washington, D. C., May 21, 1901.

### BALTIMORE.

We have used the American Newspaper Directory for many years and find it more valuable to us than any other similar publication. Much of the information given we cannot obtain in any other way. The book is not only a great help but a necessity to our business, and we think its way of stating circulations is the ideal one.

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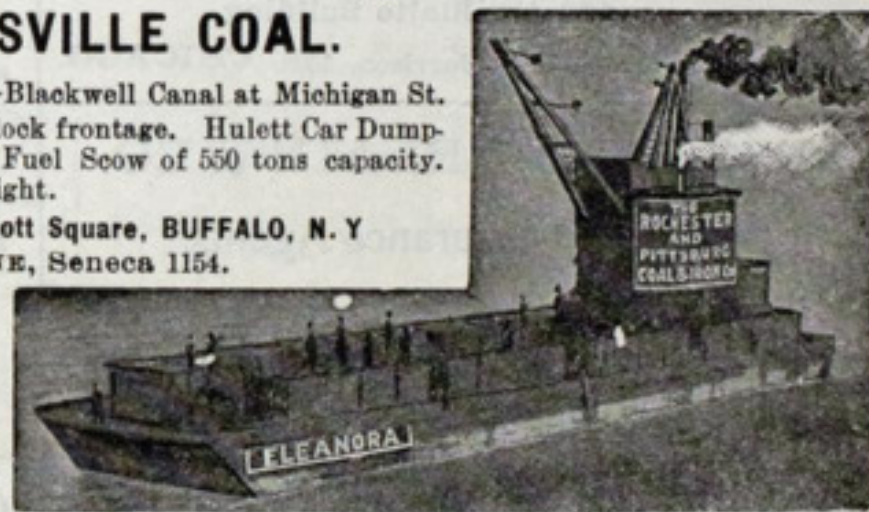
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See accompanying Index of Advertisers for full addresses of concerns in this directory.

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Lane & DeGroot.....Brooklyn.  
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Babcock & Wilcox Co.....New York.  
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Boyer Water Tube Boiler Co.....New York.  
Chicago Ship Building Co.....Chicago.  
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Detroit Shipbuilding Co.....Detroit.  
Farrar & Trefts.....Buffalo.  
Fletcher, W. & A. Co.....Hoboken, N. J.  
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Gas Engine & Power Co.....Morris Heights, N. Y.  
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Harlan & Hollingsworth Co.....Wilmington, Del.  
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Risdon Iron Works.....San Francisco.  
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Hyde Windlass Co.....Bath, Me.

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 General Electric Co.....New York.  
 Hodge, S. F. & Co.....Detroit.  
 Hyde Windlass Co.....Bath, Me.  
 Lidgerwood Mfg. Co.....New York.  
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 La Salle & Co.....Duluth.  
 Mitchell & Co.....Cleveland.  
 Osborn, F. H. & Co.....Chicago.  
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 Pickands, Mather & Co.....Cleveland.

## IRON OR STEEL STAYBOLTS, HOLLOW OR SOLID.

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## LATHES OF ALL KINDS.

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 Pratt & Whitney Co.....Hartford, Conn.

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 Lane & DeGroot.....Brooklyn.

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## MACHINE TOOLS.

Bement, Miles & Co.....Philadelphia.  
 Niles Tool Works Co.....Hamilton, O.  
 Pond Machine Tool Co.....Plainfield, N. J.  
 Pratt & Whitney Co.....Hartford, Conn.

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N. Y. Mallet &amp; Handle Works.....New York.

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 Lein, Irvine & Co.....New York.

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American Blower Co.....Detroit.  
 American Ship Building Co.....Cleveland.  
 Boston Blower Co.....Hyde Park, Mass.  
 Bloomsburg & Co., H.....Newport News, Va.  
 Buffalo Forge Co.....Buffalo.  
 Detroit Shipbuilding Co.....Detroit.  
 Sturtevant, B. F. Co.....Boston.

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 U. S. Metallic Packing Co.....Philadelphia.

## METALS FOR BEARINGS.

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 Phosphor Bronze Smelting Co., Ltd.....Philadelphia.

## METAL POLISH.

Bertram's Oil Polish Co.....Boston, Mass.

## MILLING MACHINES OF ALL KINDS.

Bement, Miles & Co.....Philadelphia.  
 Niles Tool Works Co.....Hamilton, O.

## NAUTICAL INSTRUMENTS.

Bliss, John & Co.....New York.  
 Ritchie, E. S. & Sons.....Brookline, Mass.

## NAVAL ARCHITECTS.

Gaskin, Edward.....Buffalo.  
 See, Horace.....New York.  
 Wood, W. J.....Chicago.

## OAKUM.

Stratford Oakum Co., Geo.....Jersey City, N. J.

## OILS AND LUBRICANTS.

Dixon Crucible Co., Joseph.....Jersey City, N. J.  
 Standard Oil Co.....Cleveland.

## PACKING.

Crane Co.....Chicago.  
 Garlock Packing Co.....Palmyra, N. Y.  
 Jenkins Bros.....New York.  
 Katzenstein, L. & Co.....New York.  
 Sayen & Schultz.....Philadelphia.  
 U. S. Metallic Packing Co.....Philadelphia.

## PAINTS.

Baker, Howard H. & Co.....Buffalo.  
 Toch Bros.....New York.  
 Upson-Walton Co.....Cleveland.

## PATENT ATTORNEYS.

Thurston &amp; Bates.....Cleveland.

## PATTERN SHOP MACHINERY.

Atlantic Works, Inc.....Philadelphia.

## PIPE THREADING AND CUTTING MACHINES.

Merrell Mfg. Co.....Toledo, O.

## PIPE, WROUGHT IRON.

Bourne-Fuller Co.....Cleveland.  
 Crane Co.....Chicago.

## PLANERS OF ALL KINDS.

Bement, Miles & Co.....Philadelphia.  
 Niles Tool Works Co.....Hamilton, O.

## PLANING MILL MACHINERY.

Atlantic Works, Inc.....Philadelphia.

## PLATE BENDING AND PLANING MACHINES.

Bement, Miles & Co.....Philadelphia.  
 Cleveland Punch & Shear Works Co.....Cleveland.  
 Niles Tool Works Co.....Hamilton, O.  
 Wood & Co., R. D.....Philadelphia.

## PLUMBING, MARINE.

Reilly Repair & Supply Co., James.....New York.  
 Sands, Alfred B. & Son.....New York.

## PNEUMATIC TOOLS.

Standard Pneumatic Tool Co.....Chicago.

## POLISH FOR METALS.

Bertram's Oil Polish Co.....Boston.

## PRESSURE REGULATORS.

D'Este Co., Julian.....Boston.

## PROPELLER WHEELS.

American Ship Building Co.....Cleveland.  
 Atlantic Works.....East Boston, Mass.  
 Bath Iron Works, Ltd.....Bath, Me.  
 Cramp, Wm. & Sons.....Philadelphia.  
 Detroit Shipbuilding Co.....Detroit.  
 Farrar & Trefts.....Buffalo.  
 Fore River Ship & Engine Co.....Quincy, Mass.  
 Hardy, John B.....Tacoma, Wash.  
 Hyde Windlass Co.....Bath, Me.

Harlan & Hollingsworth Co.....Wilmington, Del.  
 Hodge, S. F. & Co.....Detroit.  
 Jenks Ship Building Co.....Port Huron, Mich.  
 Lockwood Mfg. Co.....East Boston, Mass.  
 MacKinnon Mfg. Co.....Bay City, Mich.  
 Maryland Steel Co.....Sparrow's Point, Md.  
 Moran Bros. Co.....Seattle, Wash.  
 Neafe & Levy Ship & Engine Bldg. Co.....Philadelphia.  
 Newport News Ship Building Co.....Newport News, Va.  
 Nixon, Lewis.....Elizabeth, N. J.  
 Phosphor Bronze Smelting Co., Ltd.....Philadelphia.  
 Pusey & Jones Co.....Wilmington, Del.  
 Risdon Iron Works.....San Francisco.  
 Sheriffs Mfg. Co.....Milwaukee.  
 Trigg, Wm. R. Co.....Richmond, Va.  
 Trout, H. G.....Buffalo.

## PROJECTORS, ELECTRIC.

Badt-Goltz Engineering Co.....Chicago.  
 Elwell-Parker Electric Co.....Cleveland.  
 General Electric Co.....Schenectady, N. Y.  
 Rushmore Dynamo Works.....Jersey City, N. J.  
 Seidler-Miner Electric Co.....Detroit.  
 Westinghouse Electric & Mfg. Co.....Pittsburg.

## PUMPS FOR VARIOUS PURPOSES.

Blake, Geo. F. Mfg. Co.....New York.  
 Kingsford Foundry & Machine Works.....Oswego, N. Y.  
 Wood, R. D. & Co.....Philadelphia.  
 Worthington, Henry R.....New York.

## PUNCHES, RIVETERS, SHEARS.

Bement, Miles & Co.....Philadelphia.  
 Cleveland Punch & Shear Works Co.....Cleveland.  
 Niles Tool Works Co.....Hamilton, O.  
 Wood, R. D. & Co.....Philadelphia.

## REGISTER FOR CLASSIFICATION OF VESSELS.

Great Lakes Register.....Cleveland.

## RELEASING HOOKS FOR DETACHING BOATS.

Standard Automatic Releasing Hook Co.....New York.

## RIVETS, STEEL, FOR SHIPS AND BOILERS.

Bourne-Fuller Co.....Cleveland.  
 Champion Rivet Co.....Cleveland.

## R. I. W. DAMP RESISTING PAINT.

Toch Bros.....New York.

## RIGGING ROPE (WIRE).

American Steel &amp; Wire Co.....Chicago.

## RUBBER GOODS.

Hale Rubber Co., Alfred.....So. Boston, Mass.

## RUBBER INSULATED WIRES.

Roebbing's Sons, John A.....New York and Cleveland.  
 American Steel & Wire Co.....Chicago.

## SAFETY VALVES.

American Steam Gauge Co.....Boston.  
 Ashton Valve Co.....Boston.  
 Crosby Steam Gauge & Valve Co.....Boston.

## SAIL MAKERS.

Baker, Howard H. & Co.....Buffalo.  
 Upson-Walton Co.....Cleveland.  
 Wilson & Silsby.....Boston.

## SALVAGE COMPANIES.

See wrecking companies.

## SEAM COMPOSITION AND ELASTIC SEAM PAINT.

Cole &amp; Kuhls.....Brooklyn.

## SEARCH LIGHTS.

Badt-Goltz Engineering Co.....Chicago.  
 Elwell-Parker Electric Co.....Cleveland.  
 General Electric Co.....Schenectady, N. Y.  
 Rushmore Dynamo Works.....Jersey City, N. J.  
 Seidler-Miner Electric Co.....Detroit.  
 Westinghouse Electric & Mfg. Co.....Pittsburg.

## SHAPERS.

Bement, Miles & Co.....Philadelphia.  
 Niles Tool Works Co.....Hamilton, O.  
 Pratt & Whitney Co.....Hartford, Conn.

## SHEARS.

See punches, riveters and shears.

## SHIP AND BOILER PLATES AND SHAPES.

Bourne-Fuller Co.....Cleveland.

## SHIP BUILDERS.

American Ship Building Co.....Cleveland.  
 Atlantic Works.....East Boston, Mass.  
 Bath Iron Works, Ltd.....Bath, Me.  
 Buffalo Dry Dock Co.....Buffalo.  
 Cramp, Wm. & Sons.....Philadelphia.  
 Craig Ship Building Co.....Toledo, O.  
 Chicago Ship Building Co.....Chicago.  
 Detroit Shipbuilding Co.....Detroit.  
 Fore River Ship & Engine Co.....Quincy, Mass.  
 Hardy, John B.....Tacoma, Wash.  
 Harlan & Hollingsworth Co.....Wilmington, Del.  
 Jenks Ship Building Co.....Port Huron, Mich.  
 Lockwood Mfg. Co.....East Boston, Mass.  
 Maryland Steel Co.....Sparrow's Point, Md.  
 Moran Bros. Co.....Seattle, Wash.  
 Neafe & Levy Ship & Engine Bldg. Co.....Philadelphia.  
 Newport News Ship Building Co.....Newport News, Va.  
 Nixon, Lewis.....Elizabeth, N. J.  
 Pusey & Jones Co.....Wilmington, Del.  
 Risdon Iron Works.....San Francisco.  
 Roach's Ship Yard.....Chester, Pa.  
 Trigg, Wm. R. Co.....Richmond, Va.  
 Willard, Chas. P. & Co.....Chicago.

## SHIP CHANDLERS.

Baker, Howard H. & Co.....Buffalo.  
 Moran Bros. Co.....Seattle, Wash.  
 Reilly Repair & Supply Co., James.....New York.  
 Upson-Walton Co.....Cleveland.



## BUYERS' DIRECTORY OF THE MARINE TRADE.—Continued.

## SOUNDING APPARATUS.

Farr, C. W. .... Chicago.

## SPARS—LARGE SIZES.

Moran Bros. Co. .... Seattle, Wash.

## STAYBOLTS, IRON OR STEEL, HOLLOW OR SOLID.

Falls Hollow Staybolt Co. .... Cuyahoga Falls, O.

## STEAM VESSEL FOR SALE.

Holmes, Samuel. .... New York.

## STEAMSHIP LINES, PASS. AND FREIGHT.

Algoma Central Co. .... Sault Ste. Marie, Ont.  
 American Line. .... New York.  
 Cleveland & Buffalo Transit Co. .... Cleveland.  
 Dominion Line. .... Boston.  
 Erie & Western Trans. Co. .... Buffalo.  
 International Nav. Co. .... Philadelphia.  
 Red Star Line. .... New York.

## STEEL CASTINGS.

Seaboard Steel Casting Co. .... Chester, Pa.

## STEERING APPARATUS.

American Ship Building Co. .... Cleveland.  
 Chase Machine Co. .... Cleveland.  
 Detroit Shipbuilding Co. .... Detroit.  
 Electro-Dynamic Co. .... Philadelphia.  
 Hyde Windlass Co. .... Bath, Me.  
 Jenks Ship Building Co. .... Port Huron, Mich.  
 Queen City Engineering Co. .... Buffalo.  
 Sheriffs Mfg. Co. .... Milwaukee.

## STOCKS, BONDS, SECURITIES.

Wright, Herbert &amp; Co. .... Cleveland.

## STOCKLESS ANCHORS.

Baldt Anchor Co. .... Chester, Pa.  
 International Anchor Co. .... Cleveland.

## SUBMARINE DIVING APPARATUS.

Hale Rubber Co., Alfred. .... So. Boston, Mass.  
 Schrader's Son, A. .... New York.

## SURVEYORS, MARINE.

Gaskin, Edward. .... Buffalo.  
 See, Horace. .... New York.  
 Wood, W. J. .... Chicago.

## TELEGRAPH—DECK AND ENGINE ROOM.

Cory, Chas. &amp; Son. .... New York.

## TESTS OF MATERIAL.

Hunt, Robert W. & Co. .... Chicago.  
 Pittsburgh Testing Laboratory, Ltd. .... Pittsburgh.

## THERMOMETERS FOR MECHANICAL PURPOSES.

Hellos-Upton Co. .... Peabody, Mass.

## TOOLS, METAL WORKING, FOR SHIP AND ENGINE WORKS.

Bement, Miles & Co. .... Philadelphia.  
 Cleveland Punch & Shear Works Co. .... Cleveland.  
 New Doty Mfg. Co. .... Janesville, Wis.  
 Niles Tool Works Co. .... Hamilton, O.  
 Pond Machine Tool Co. .... Plainfield, N. J.  
 Pratt & Whitney Co. .... Hartford, Conn.  
 Standard Pneumatic Tool Co. .... Chicago.  
 Watson-Stillman Co. .... New York.  
 Wood, R. D. & Co. .... Philadelphia.

## TOOLS, WOOD WORKING.

Atlantic Works, Inc. .... Philadelphia.

## TOPOPHONE—Prevents disasters in fogs.

Colt Co. J. B. .... New York.

## TOWING MACHINES.

American Ship Windlass Co. .... Providence, R. I.  
 Chase Machine Co. .... Cleveland.

## TOWING COMPANIES.

Donnelly Salvage & Wrecking Co. .... Kingston, Ont.  
 Midland Towing & Wrecking Co., Ltd. .... Midland, Ont.  
 Swain Wrecking Co. .... Detroit.

## TRAPS, STEAM.

D'Este Co., Julian. .... Boston.  
 Haines Co., Wm. S. .... Philadelphia.

## TRUCKS.

Boston &amp; Lockport Block Co. .... Boston.

## TUBING, SEAMLESS.

Benedict & Burnham Mfg. Co. .... Waterbury, Conn.  
 Standard Seamless Tube Co. .... Pittsburgh.

## VALVES, STEAM SPECIALTIES, ETC.

American Steam Gauge Co. .... Boston.  
 Ashton Valve Co. .... Boston.  
 Crane Co. .... Chicago.  
 Crosby Steam Gauge & Valve Co. .... Boston.  
 D'Este Co., Julian. .... Boston.  
 Jenkins Bros. .... New York.  
 Wood & Co., R. D. .... Philadelphia.

## VARNISH PAINT.

Mair, John &amp; Son. .... Philadelphia.

## VESSEL AND FREIGHT AGENTS.

Boland, John J. .... Buffalo.  
 Brown & Co. .... Buffalo.  
 Chamberlain & Co., S. R. .... Chicago.  
 Drake & Maytham. .... Buffalo.  
 Elphicke, C. W. & Co. .... Chicago.

Hall & Root. .... Buffalo.  
 Helm, D. T. & Co. .... Duluth, Minn.  
 Holmes, Samuel. .... New York.  
 Hutchinson & Co. .... Cleveland.  
 Keith, J. G. & Co. .... Chicago.  
 Kennedy Hunter & Co. .... Antwerp.  
 Mitchell & Co. .... Cleveland.  
 Richardson, W. C. .... Cleveland.  
 Sullivan, D. & Co. .... Chicago.  
 Tandy, Frank N. .... Boston.

## VENTILATING APPARATUS FOR SHIPS.

American Blower Co. .... Detroit.  
 Boston Blower Co. .... Hyde Park, Mass.  
 Buffalo Forge Co. .... Buffalo.  
 Sturtevant, B. F. Co. .... Boston.

## WIRE ROPE AND WIRE ROPE FITTINGS.

American Steel & Wire Co. .... Chicago.  
 Baker, H. H. & Co. .... New York and Cleveland.  
 Roebling's Sons, John A. .... Cleveland.  
 Upson-Walton Co. .... Cleveland.

## WHISTLES, STEAM.

American Steam Gauge Co. .... Boston.  
 Ashton Valve Co. .... Boston.  
 Crosby Steam Gauge & Valve Co. .... Boston.

## WINDLASSES.

American Ship Windlass Co. .... Providence, R. I.  
 American Ship Building Co. .... Cleveland.  
 Hyde Windlass Co. .... Bath, Me.  
 Jenks Ship Building Co. .... Port Huron, Mich.

## WINCHES.

American Ship Windlass Co. .... Providence, R. I.  
 Hyde Windlass Co. .... Bath, Me.

## WOOD WORKING MACHINERY.

Atlantic Works, Inc. .... Philadelphia.

## WRECKING AND SALVAGE COMPANIES.

Donnelly Salvage & Wrecking Co. .... Kingston, Ont.  
 Midland Towing & Wrecking Co., Ltd. .... Midland, Ont.  
 Swain Wrecking Co. .... Detroit.

## YACHT SAILS, FITTINGS, HARDWARE, ETC.

Wilson &amp; Silsby. .... Boston.

## YACHT AND BOAT BUILDERS.

Dreih, Thos. & Son. .... Wilmington, Del.  
 Gas Engine & Power Co. .... New York.  
 Lane & DeGroot. .... Brooklyn.  
 Willard, Chas. P. & Co. .... Chicago.

## YAWLS.

Dreih, Thos. & Son. .... Wilmington, Del.  
 Lane & DeGroot. .... Brooklyn.

## ALPHABETICAL INDEX OF ADVERTISERS IN THE MARINE REVIEW.

The star (\*) indicates that the advertisement appears alternate weeks. For addresses see advertisements on pages noted.

Algoma Central Steamship Line. .... 39	Delaware River Iron S. B. & E. Works. .... 5	Kahnweiler's Sons, David. .... 4	Reynolds, H. J. .... 9
Almy Water Tube Boiler Co. .... 11	Detroit Shipbuilding Co. .... 1	Katzenstein, L. & Co. .... 4	Richards, Mills & Co. .... 12
American Blower Co. .... 40	Dixon Crucible Co., Joseph. .... 9	Keith, J. G. & Co. .... 34	Richardson, W. C. .... 34
American Line. .... 7	Dominion Line. .... 12	Kennedy Hunter & Co. .... 3	Risdon Iron Works. .... 5
American Ship Building Co. .... 1	Donnelly Salvage & Wrecking Co. .... 27	Kingsford Foundry & Machine Works. .... 30	*Ritchie & Sons, E. S. .... 30
American Ship Windlass Co. .... 2	Drake & Maytham. .... 34	Lake Shore Engine Works. .... 1	Roach's Ship Yard. .... 5
American Steam Gauge Co. .... 1	Dreih, Thos. & Son. .... 4	Lane & DeGroot. .... 4	Roberts Water Tube Boiler Co. .... 11
American Steel & Wire Co. .... 1	Duluth, South Shore & Atlantic Ry. .... 39	*Learmonth, Robert. .... 30	Robins Conveying Belt Co. .... 1
Armstrong Cork Co. .... 40	Electro-Dynamic Co. .... 1	Lein, Irvine & Co. .... 29	Rochester & Pittsburgh Coal & Iron Co. .... 33
Ashton Valve Co. .... 12	Elphicke, C. W. & Co. .... 34	Lidgerwood Mfg. Co. .... 10	*Roebling's, John A. Sons Co. .... 40
Atlantic Works. .... 5	Elwell-Parker Electric Co. .... 2	Lockwood Mfg. Co. .... 4	Rushmore Dynamo Works. .... 4
*Atlantic Works, Inc. .... 7	Erie & Western Trans. Co. .... 27	*"Long Arm" System Co. .... 3	Safety Car Heating & Lighting Co. .... 31
Babcock & Wilcox Co. .... 11	Falls Hollow Staybolt Co. .... 4	L. S. & M. S. Ry. .... 39	Sands, Alfred B. & Son. .... 10
Badt-Goltz Engineering Co. .... 29	Farr, C. W. .... 6	MacDonald, Ray G. .... 34	Sayen & Schultz. .... 1
Baldt Anchor Co. .... 9	Farrar & Trefts. .... 5	MacKinnon Mfg. Co. .... 8	Scherzer Rolling Lift Bridge Co. .... 6
Baker, Howard H. & Co. .... 6	Fletcher, W. & A. Co. .... 4	Mair, John & Son. .... 6	Schrader's Son, A. .... 8
Bath Iron Works, Ltd. .... 1	Fogg, M. W. .... 31	*Marine Iron Co. .... 7	Scott Co., The W. L. .... 32
Bement, Miles & Co. .... 3	Fore River Ship & Engine Co. .... 5	Martin-Barriss Co. .... 8	Seaboard Steel Casting Co. .... 27
Benedict & Burnham Mfg. Co. .... 25	Garlock Packing Co. .... 27	Maryland Steel Co. .... 5	See, Horace. .... 34
Bertram's Oil Polish Co. .... 1	Gas Engine & Power Co. and Chas. L. Seabury & Co., Consolidated. .... 31	Merrell Mfg. Co. .... 5	Seidler-Miner Electric Co. .... 8
Big Four Railway. .... 39	Gaskin, Edward. .... 34	Midland Towing & Wrecking Co., Ltd. .... 40	Sheriffs Mfg. Co. .... 10
Blake, Geo. F., Mfg. Co. .... 9	General Electric Co. .... 12	Miller, Walter. .... 9	Shipowners Dry Dock Co. .... 12
*Bliss, John & Co. .... 20	Gilchrist, Albert J. .... 34	Mitchell & Co. .... 34	Skinner Chuck Co. .... 3
*Bloomsburg & Co., H. .... 31	*Gleason-Peters Air Pump Co. .... 3	Monongahela Iron & Steel Co. .... 3	Smith, Stanley B. & Co. .... 33
Boland, J. J. .... 34	Goerz, C. P. .... 9	*Moran Bros. Co. .... 39	Smith, W. Blackburn. .... 1
Boston Blower Co. .... 4	Goulder, Holding & Masten. .... 34	Neafie & Levy Co. .... 5	Standard Chain Co. .... 10
*Boston & Lockport Block Co. .... 40	Graphite Lubricating Co. .... 9	*Newhall Chain Forge & Iron Co. .... 30	*Standard Oil Co. .... 6
*Boyer Water Tube Boiler Co. .... 31	Great Lakes Register. .... 7	Newport News Ship Building & Dry Dock Co. .... 5	Standard Releasing Hook Co. .... 2
Bourne-Fuller Co. .... 12	Haines Co., Wm. S. .... 9	New York Mallet & Handle Works. .... 30	*Standard Pneumatic Tool Co. .... 25
Brown & Co. .... 34	Hale Rubber Co., Alfred. .... 9	Niles Tool Works Co. .... 3	Standard Seamless Tube Co. .... 29
Brown Hoisting Machinery Co., Inc. .... 2	Hall & Root. .... 34	Nixon, Lewis. .... 5	Stirling Co. .... 11
Buffalo Dry Dock Co. .... 11	Hamilton-Foster Fog Signal Co. .... 3	North River Iron Works. .... 4	Stowe & Graydon. .... 34
Buffalo Forge Co. .... 12	Hanna, M. A. & Co. .... 32	Osborne & Co., F. H. .... 34	Stratford Oakum Co., Geo. .... 31
Castner, Curran & Bullitt. .... 33	Harlan & Hollingsworth Co., The. .... 5	Page Bros. & Co. .... 4	Sturtevant, B. F. Co. .... 40
Chamberlain & Co., S. R. .... 34	Hellos-Upton Co. .... 8	Parker, A. A. & B. W. .... 32	Sullivan & Co. .... 34
Champion Rivet Co. .... 8	Helm, D. T. & Co. .... 34	Peck, Chas. E. & W. F. .... 7	Swain Wrecking Co. .... 32
Chase Machine Co. .... 8	Herriman, F. D. .... 7	Phosphor Bronze Smelting Co., Ltd. .... 8	Tandy, Frank N. .... 34
Chicago Ship Building Co. .... 2	Hodge, S. F. & Co. .... 8	Pickands, Mather & Co. .... 32	Taylor Boiler Co. .... 11
*Clayton Fire Extinguishing & Disinfecting Co. .... 31	Holmes, Samuel. .... 34	Pinney, Orestes C. .... 34	Thurston & Bates. .... 34
Cleveland & Buffalo Transit Co. .... 31	Hoyt, Dustin & Kelley. .... 34	Pittsburg Coal Co. .... 33	Toch Bros. .... 29
Cleveland City Forge & Iron Co. .... 6	Hunt, Robert W. & Co. .... 34	Pittsburg Testing Laboratory, Ltd. .... 34	Trigg Co., Wm. R. .... 4
Cleveland Punch & Shear Works Co. .... 27	Hutchinson & Co. .... 34	Pond Machine Tool Co. .... 4	Trout, H. G. .... 9
C. C. C. & St. L. R. R. .... 9	Hyde Windlass Co. .... 40	Porter's Sons' Co., Wm. .... 4	Upson-Walton Co. .... 40
Cole & Kuhls. .... 9	International Anchor Co. .... 9	Powell, Ambrose V. .... 34	U. S. Metallic Packing Co. .... 40
Colt Co., J. B. .... 10	International Navigation Co. .... 7	Pratt & Whitney Co. .... 34	Walker, Thomas & Son. .... 3
Continental Iron Works. .... 2	Jenkins Brothers. .... 6-10	Pusey & Jones Co. .... 5	Watson-Stillman Co. .... 39
Cory, Chas. & Son. .... 10	Jenks Ship Building Co. .... 39	Queen City Engineering Co. .... 10	Westinghouse Electric & Mfg. Co. .... 6
*Craig Ship Building Co. .... 30		Red Star Line. .... 7	Wheeling & Lake Erie R. R. .... 39
Cramp, Wm. & Sons, S. & E. B. Co. .... 1		*Reilly Repair & Supply Co., James. .... 10	White, Johnson, McCaslin & Cannon. .... 34
Crandall & Son, H. I. .... 7			*Willard, Chas. P. & Co. .... 30
Crane Co. .... 2-6			Wilson, Thomas. .... 34
Crosby Steam Gauge & Valve Co. .... 12			Wilson & Silsby. .... 6
			Wood, W. J. .... 34
			*Wood & Co., R. D. .... 30
			Worthington, Henry R. .... 9
			Wright, Herbert & Co. .... 34
			Youghiogheny & Lehigh Coal Co. .... 33



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No. 16, New England Express	.....	*10 30 pm	*10 35 pm
No. 2, Day Express	.....	*19 05 pm	*11 30 pm
No. 126, Norwalk Accommodation	.....	*17 55 am	.....
No. 40, Toledo & Buffalo Accom., via Norwalk	.....	*10 00 am	*11 40 am
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No. 141, Sandusky Accommodation	.....	.....	*13 10 pm
No. 127, Norwalk Accommodation	.....	.....	*15 10 pm
No. 37, Pacific Express	.....	*7 00 pm	*7 20 pm
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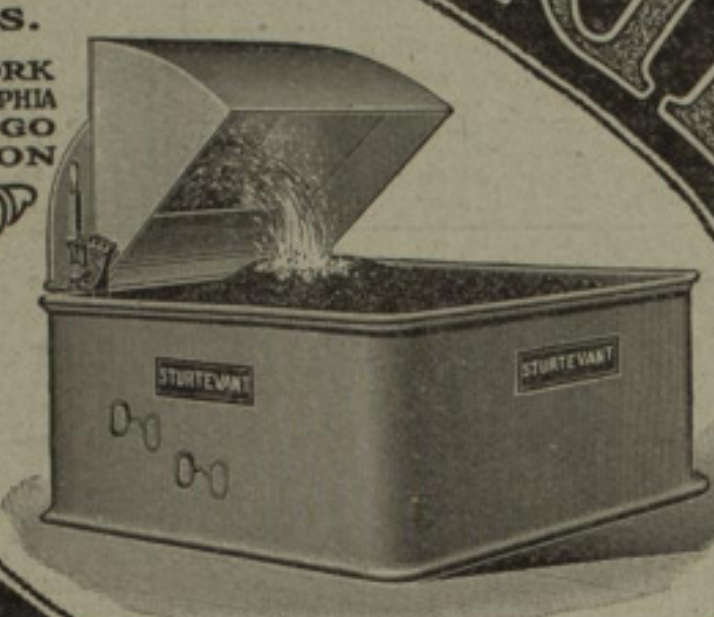
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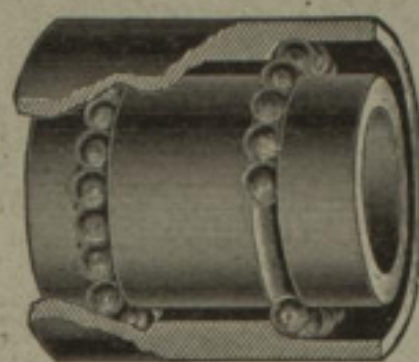
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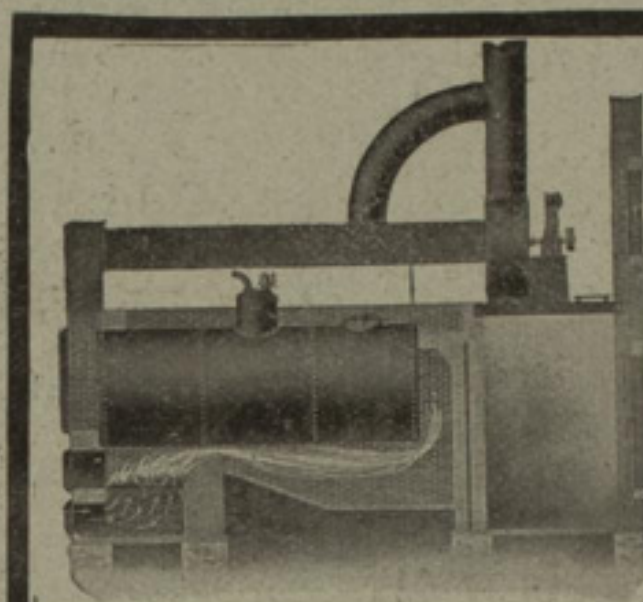


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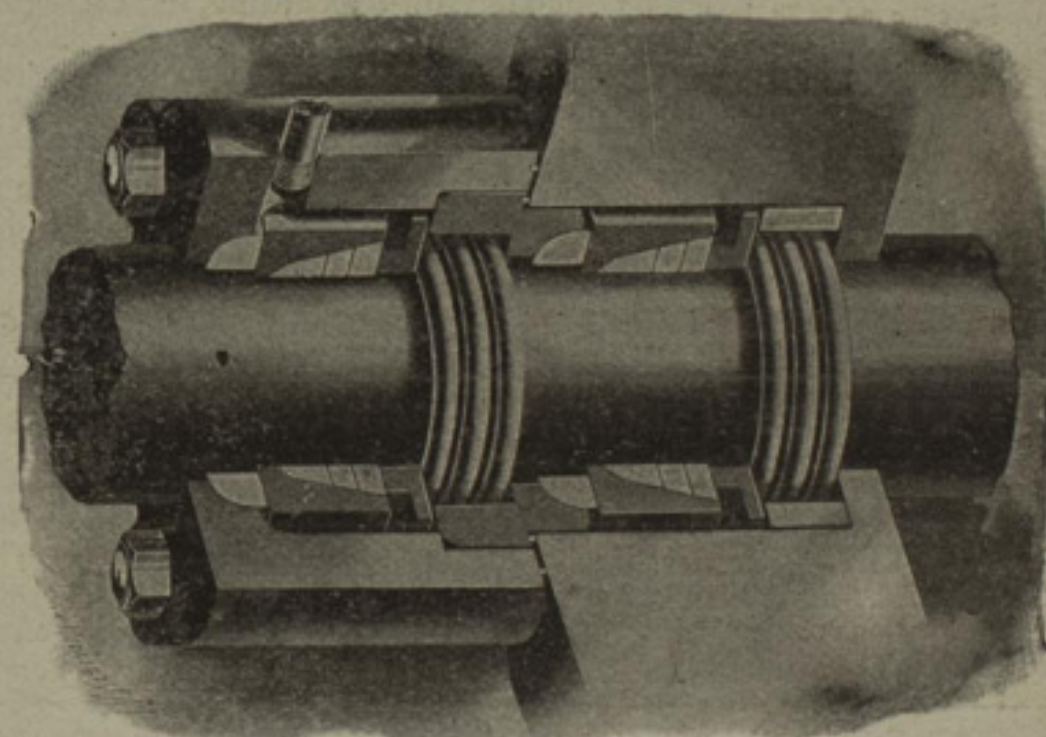
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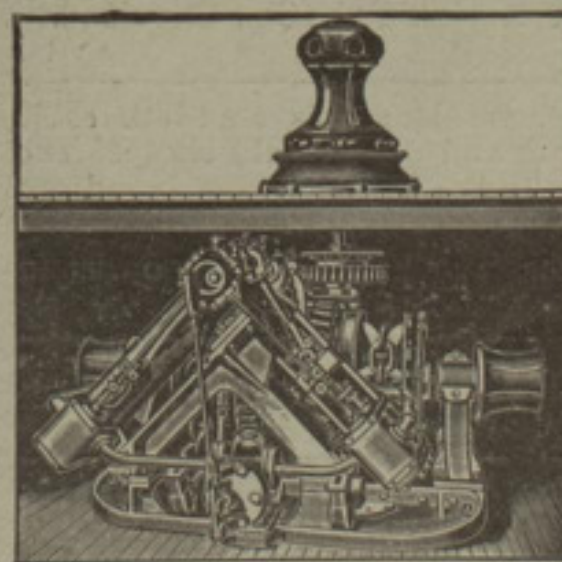
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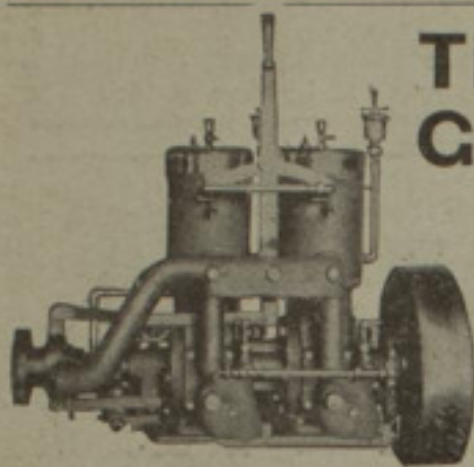


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No. 15



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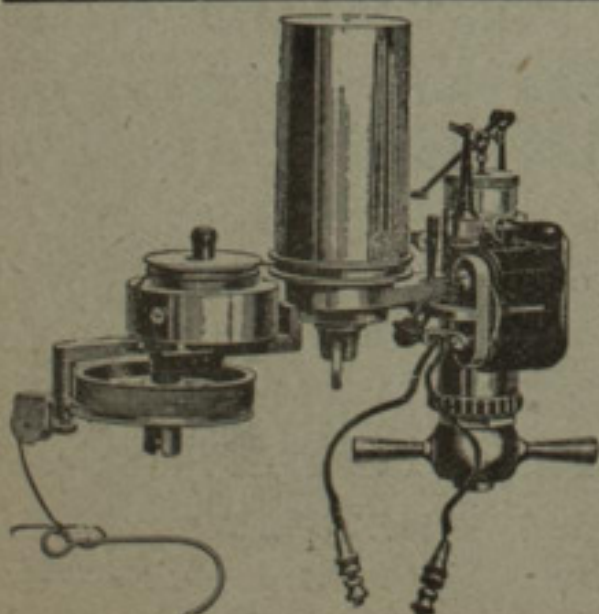
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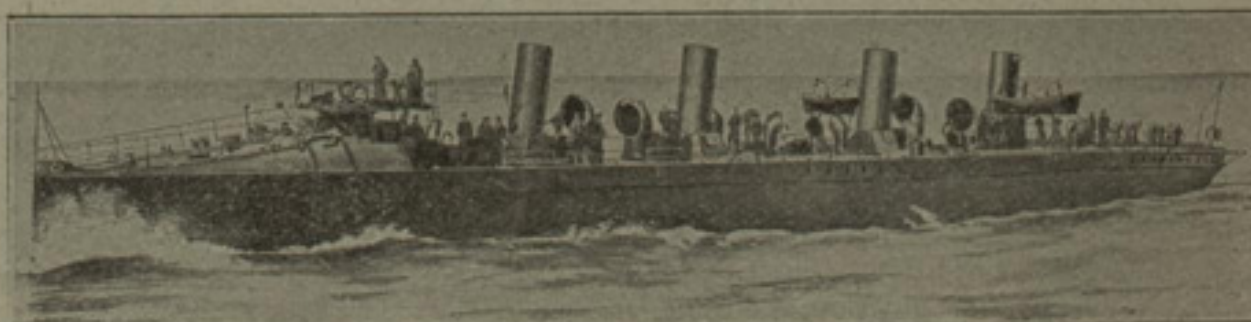
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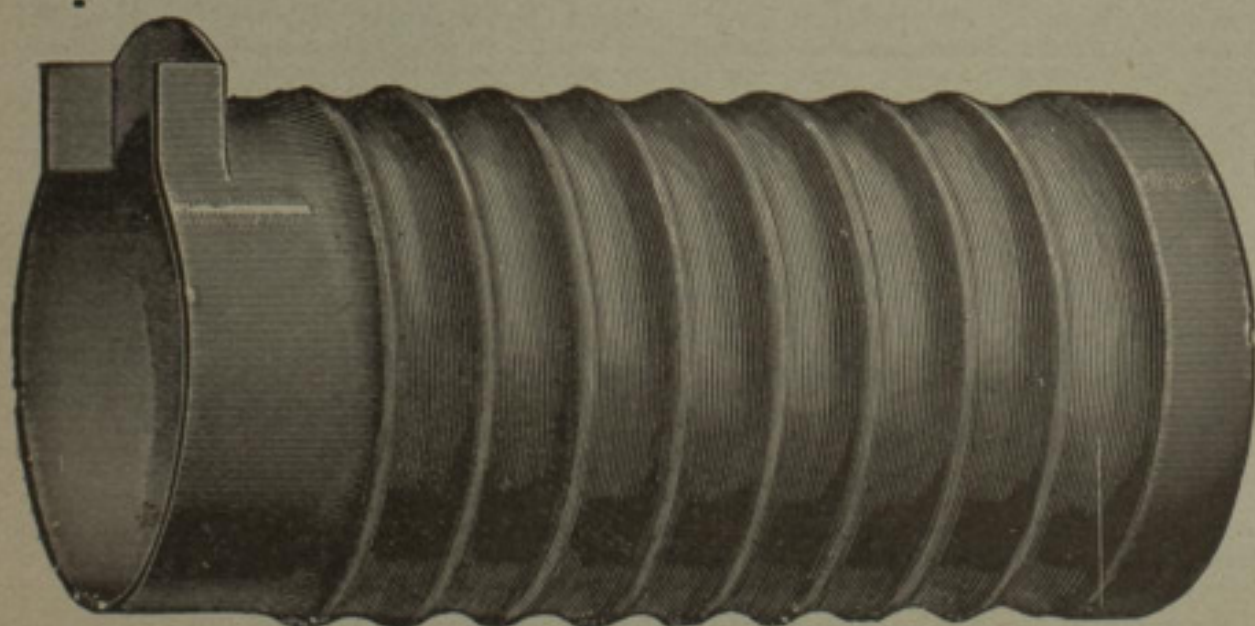
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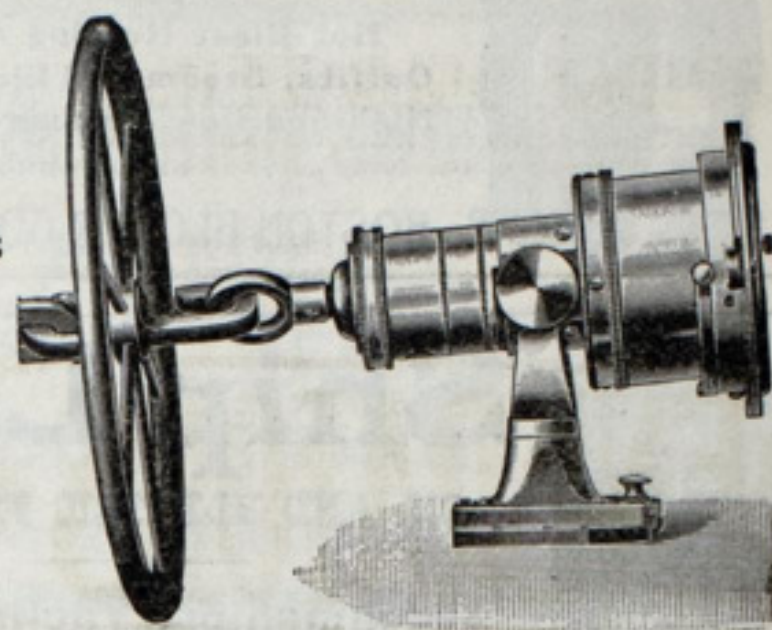
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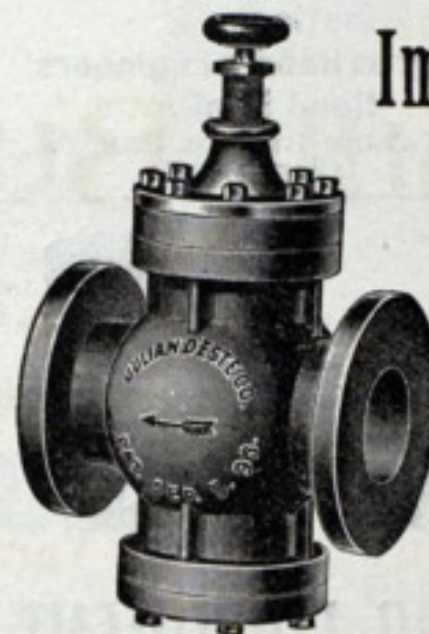
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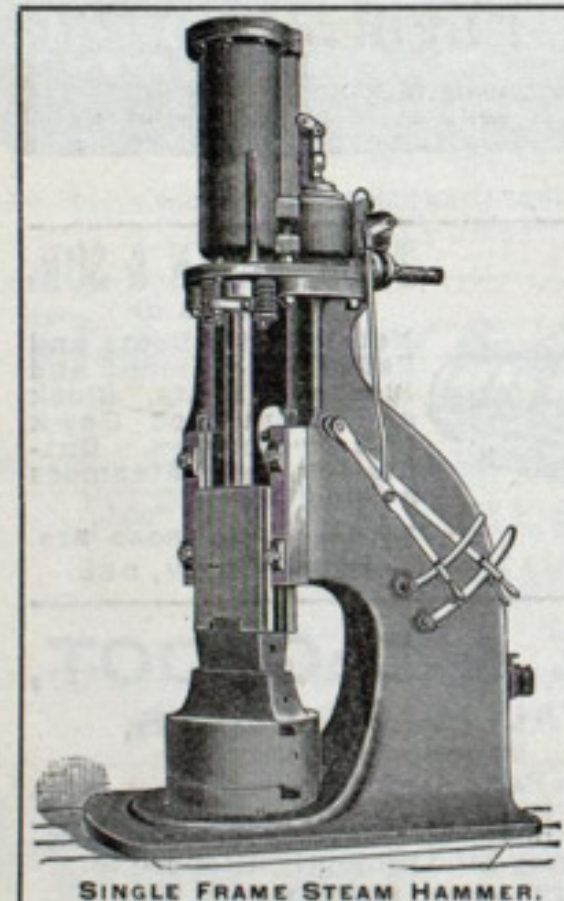


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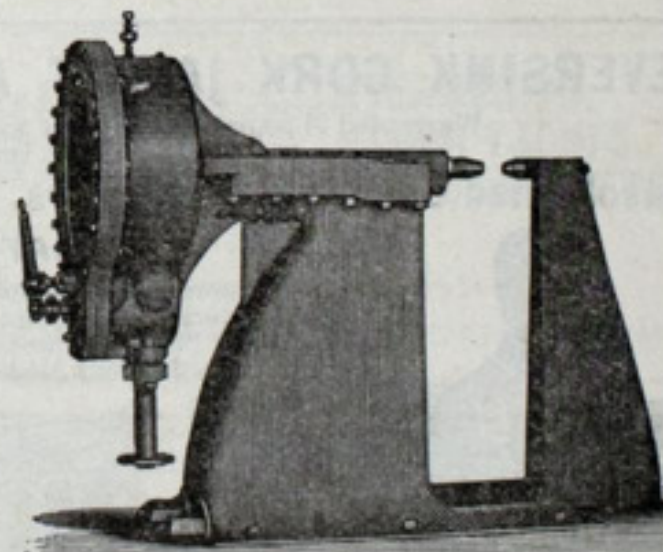
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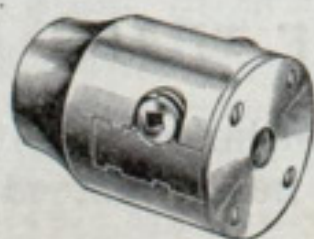
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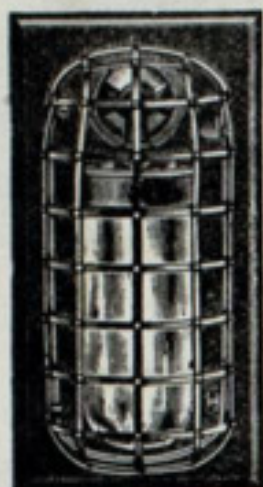
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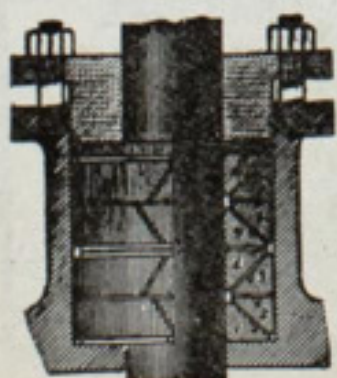
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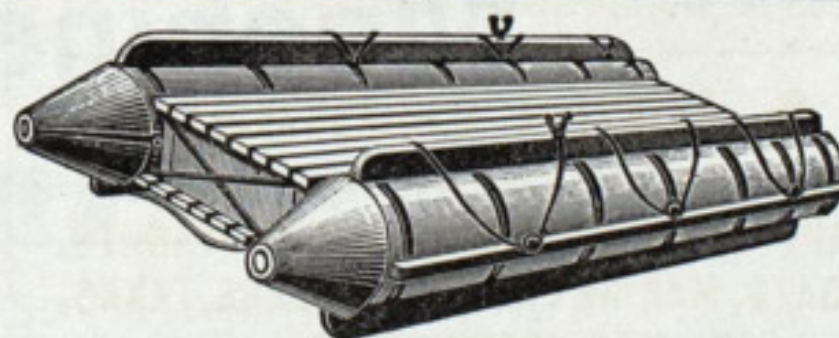
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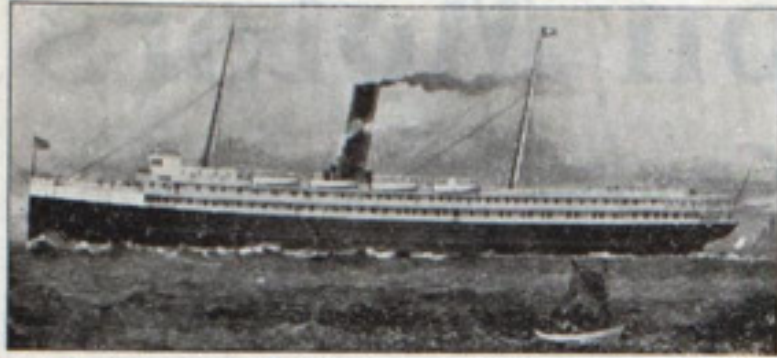
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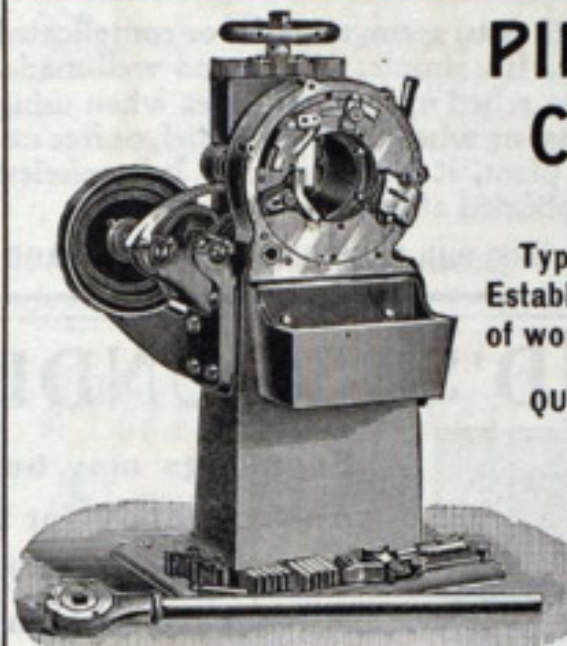
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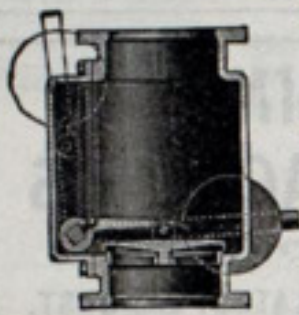
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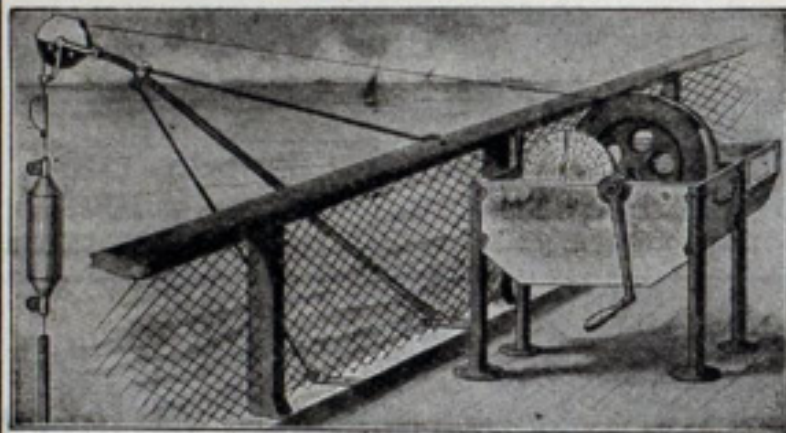
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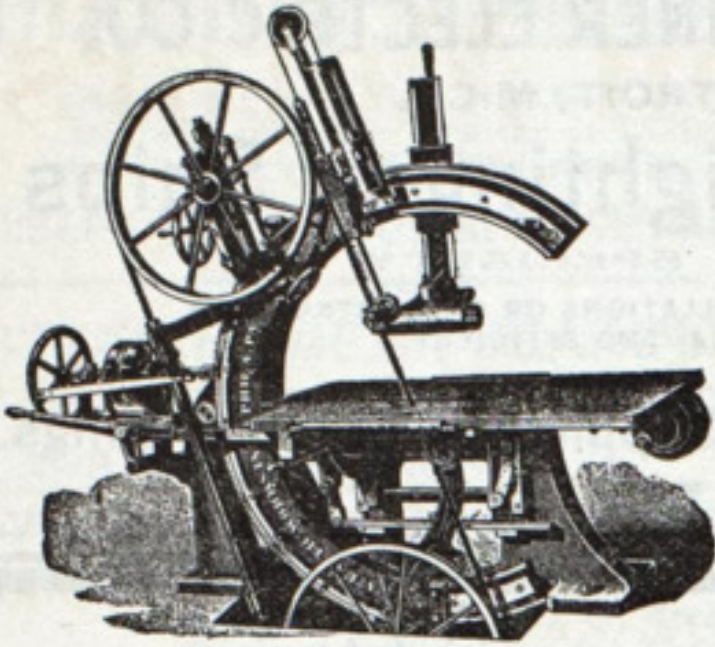
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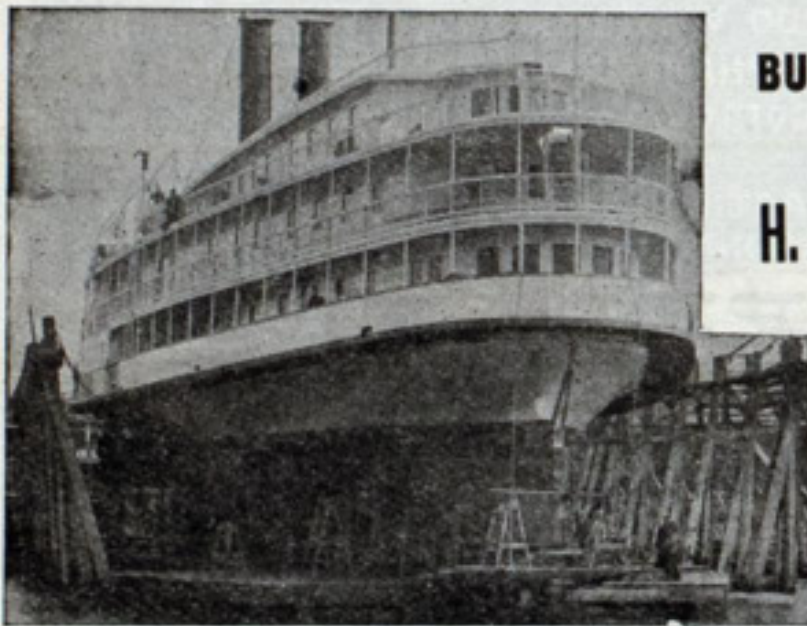
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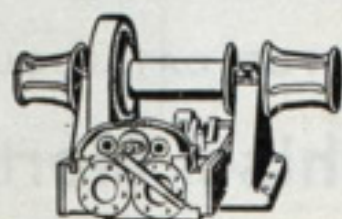
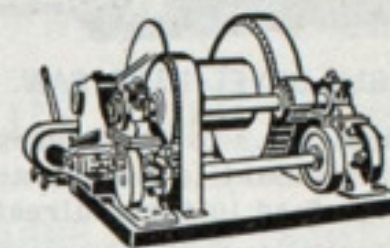
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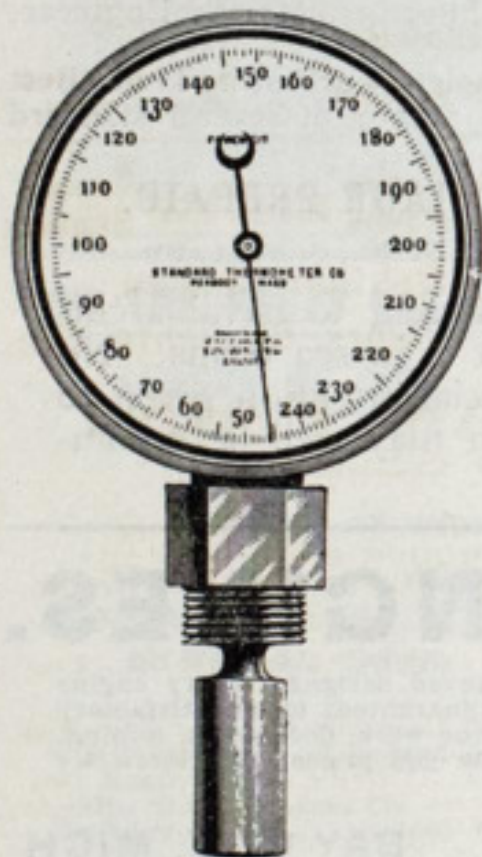
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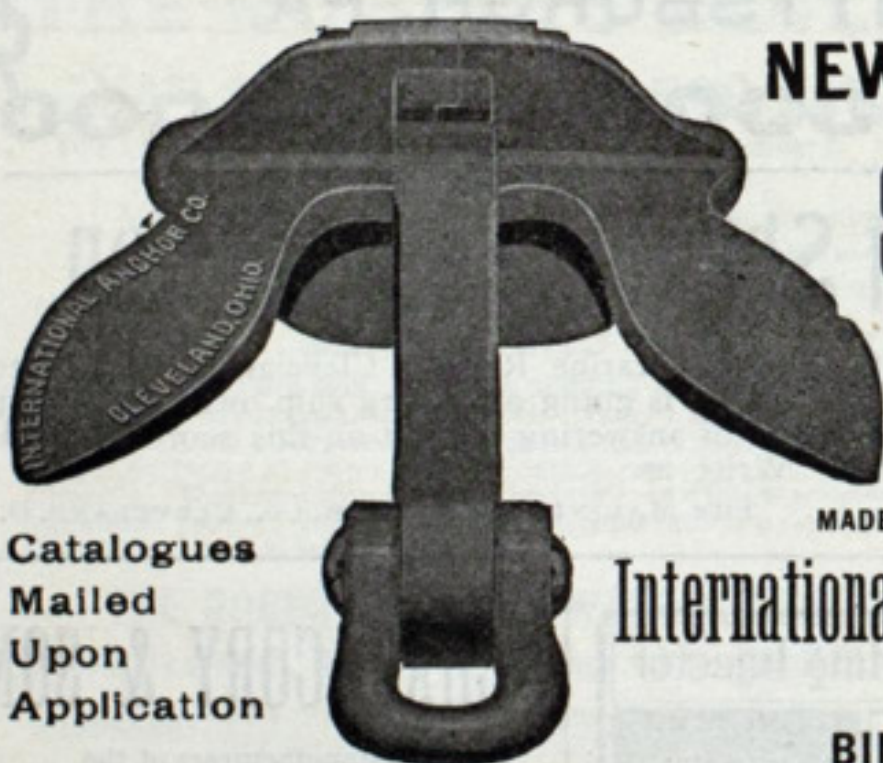
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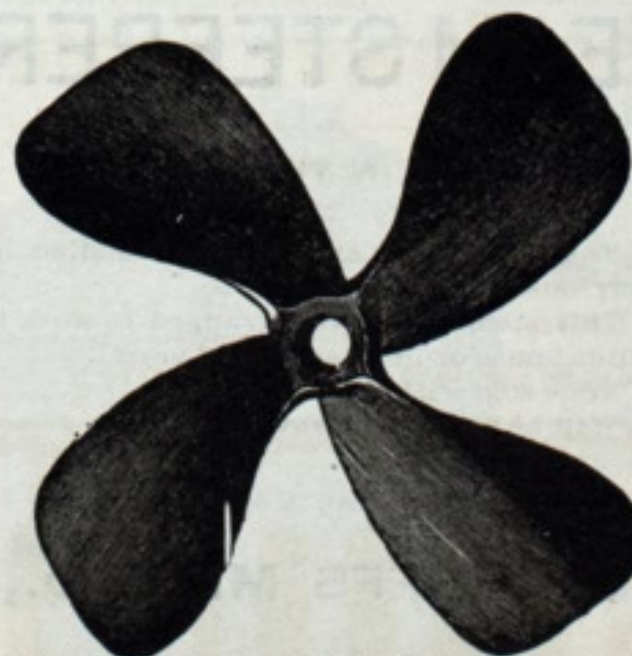
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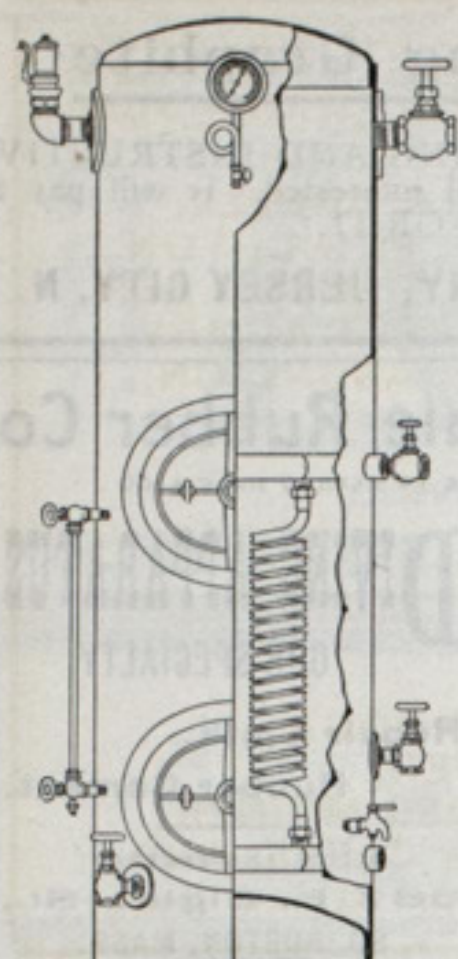
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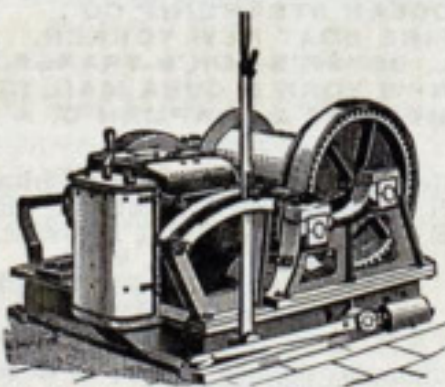
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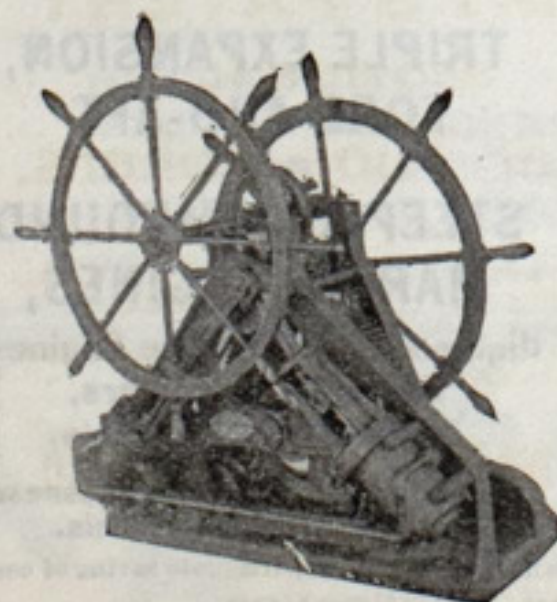
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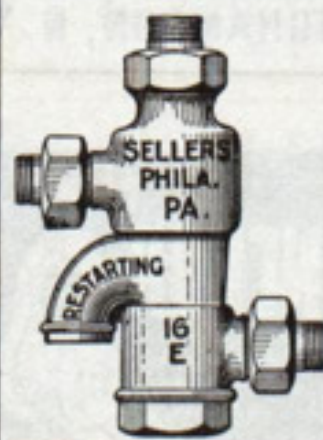
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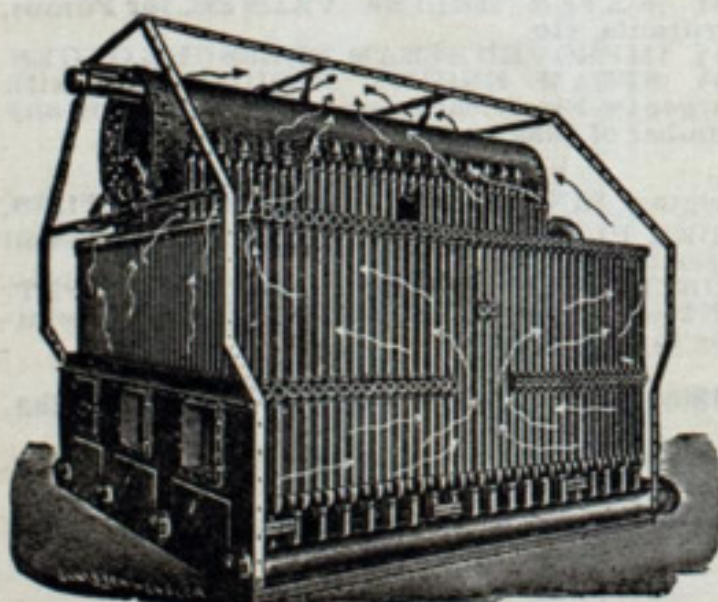
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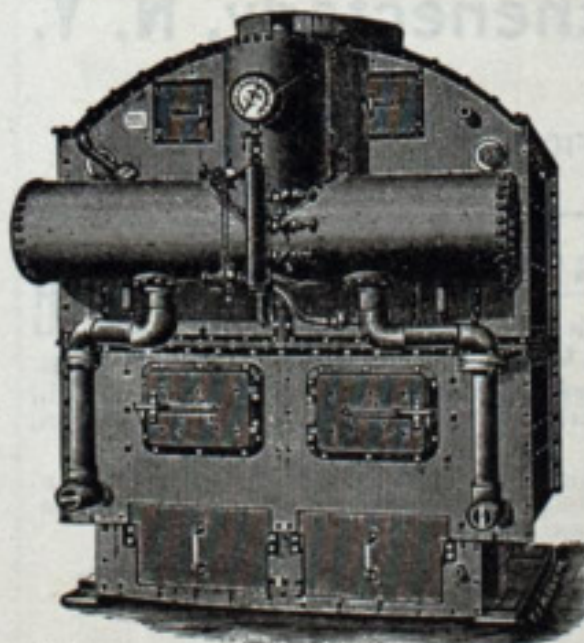
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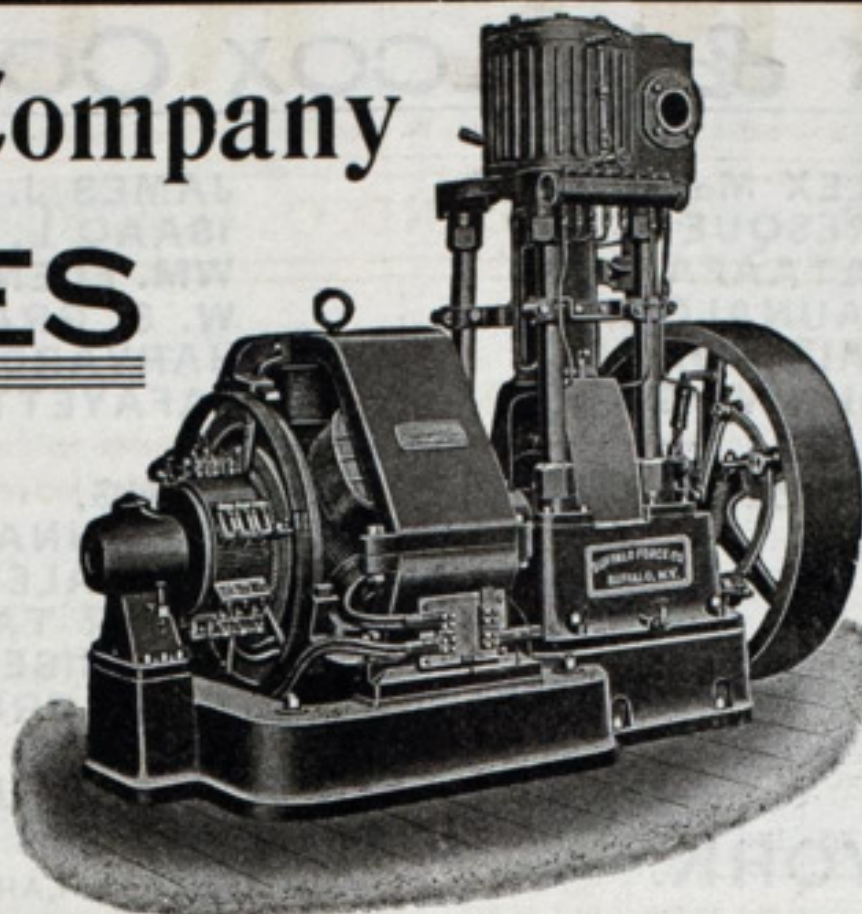




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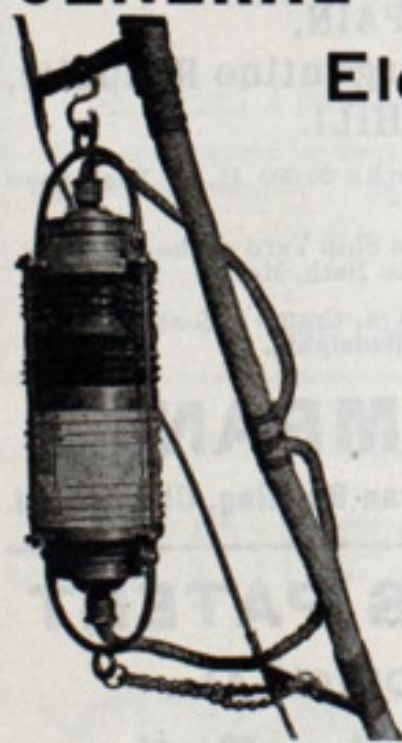
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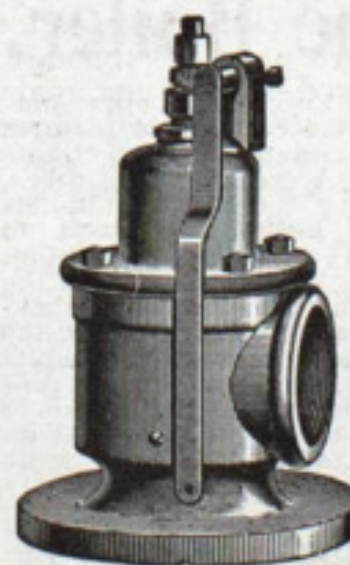
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